









**THOMAS WILFRED: LUMIA**

THOMAS WILFRED: LUMIA

A REPRODUCTION OF THE ORIGINAL

ARTWORK

The Thomas Wilfred Collection

Washington, D.C.

April 1964 - May 1964







**THOMAS WILFRED: LUMIA**

**A Retrospective Exhibition**

By Donna M. Stein

The Corcoran Gallery of Art  
Washington, D.C.

April 16 - May 30, 1971



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Cover: *Orientale*, op. 155 1962

## FOREWORD

The Corcoran Gallery of Art is proud to present the first retrospective of the work of Thomas Wilfred, the father of light art in America. The idea for the exhibition came from a conversation between Rockne Krebs and Director Walter Hopps about the origins of Krebs' art. Krebs, a young artist deeply concerned with light, looked to artists such as Naum Gabo and Thomas Wilfred for precedent and inspiration. Specifically, he urged Hopps to undertake a retrospective of Wilfred's work realizing the value of presenting the heritage of creativity in this medium to a growing generation of artists unaware of the lengthy history of exploration of light. Hopps recalled that several years earlier, a student, Donna Stein had come to him for suggestions for a master's thesis. Hopps recommended that she choose as a subject an older artist whose oral tradition and memory would be lost if someone didn't study it with him. It is fortunate for us that Miss Stein chose Thomas Wilfred, met with him many times and amassed a body of research which is the basis for this catalogue and exhibition.

The Corcoran Gallery wishes to thank Miss Stein for her dedication to this exhibition and for the creation of this catalogue which she undertook in addition to her curatorial responsibilities at The Museum of Modern Art.

We are also grateful to the son, Thomas C. Wilfred, who has generously provided us with those precious memorabilia which allow us glimpses of his father as a person.

Hal Glicksman  
Associate Director  
The Corcoran Gallery of Art



## ACKNOWLEDGEMENTS

I first became interested in the art of Thomas Wilfred in 1964 after a heated argument with Dr. Eugene Epstein on the differences between art and technology. In the fall of 1968, three years after I had finished my master's thesis on lumia and the work of Wilfred, I received a call from Walter Hopps, then Acting Director of the Corcoran. His conversation began with two unnerving questions: "Who knows the most about Thomas Wilfred in the world? Does anyone know more than you do?" My initial plans and thoughts for the exhibition date from that time.

The scope and character of this first retrospective exhibition would have been impossible without the patience, generosity, and good will of Mr. and Mrs. Thomas C. Wilfred, the artist's son and daughter-in-law. By making accessible the files from The Art Institute of Light, Inc., by sharing recollections, and by supplying family photographs and memorabilia, they helped document details of the artist's life and his milieu.

I especially offer sincere thanks to Judith Goldman for her astute editorial advice and constructive suggestions in the preparation of the manuscript. As technical consultant, Earl Reiback's contribution was invaluable. A light artist himself, and an avowed admirer of Wilfred's, Reiback purchased the contents of the artist's studio at his death; his discovery of more than forty drawings by Wilfred has presented us with another aspect of the artist's development to consider and appreciate.

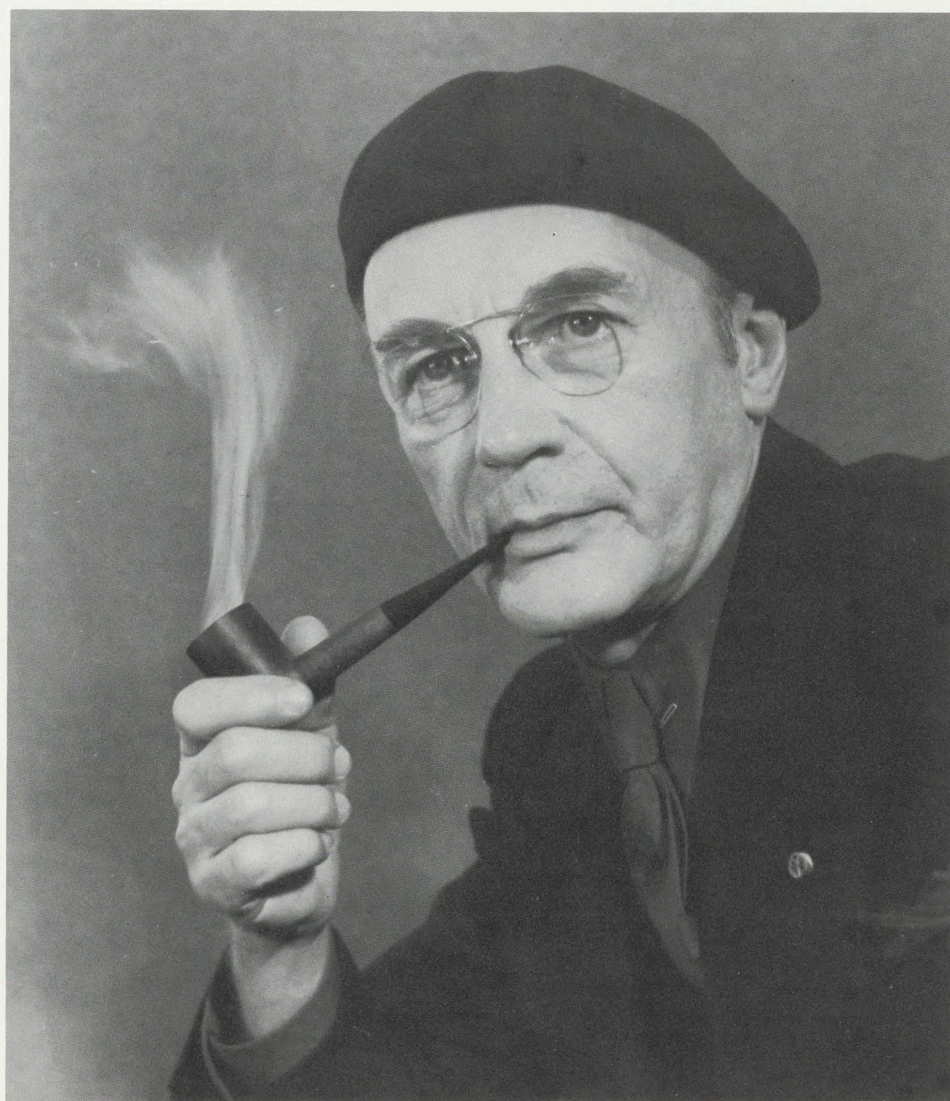
I am particularly grateful to Hal Glicksman and Judy Riley at The Corcoran Gallery of Art for their collaboration and assistance in every phase of the exhibition. Judy Riley's attention to details and supervision of the catalogue's production were essential to the coordination and success of the exhibition.

At The Museum of Modern Art, New York, I would like to express my appreciation to William S. Lieberman and Riva Castleman for permitting me to undertake this project and for supporting and encouraging my efforts. I received constant stimulus and inspiration from Margery Aronson, whose incisive questions forced me to clarify my thoughts and words.

To each of the lenders I owe a profound debt of gratitude, for without their willingness to part with extremely rare and fragile works of art, this retrospective would not have been possible. Mr. Edwin Bergman, Mr. and Mrs. John Ashby Conway, and Dr. Eugene Epstein have provided special assistance in documenting Wilfred's career.

D.M.S.





More and more artists of our generation have begun to contemplate light with the eyes of a sculptor gazing upon a block of marble—seeing in light a new and basic medium of expression with unlimited possibilities.

Thomas Wilfred



## THOMAS WILFRED BY DONNA M. STEIN

Thomas Wilfred was the first artist in this century to use light as the means for expression rather than for the illumination of real objects from nature. He began his experiments in 1905, and although Wilfred was certainly not the first to emphasize the integration of form, color, and movement as a separate art, he clarified its possibilities and invented a means to communicate his concept.

Wilfred's concerns can be traced to the Impressionists' scientific investigations of painting which concentrated on the visual and theoretical importance of light and color. They can be seen as well in the desire for movement and non-subjective abstraction that appeared in the work of Post Impressionist painters, Vincent Van Gogh, Georges Seurat, and the later Nabis.

Painting depends for its existence on external and independent light sources. Consequently, the perception of color changes. Pigments are chosen for their power to reflect or absorb available white light. Alexander Rimington, an English painter, etcher, and experimenter in light and color wrote in 1909, "In most pictures colour has necessarily remained subservient, to some extent, to [its] subjects and in any case a picture cannot give more than one colour scheme, or the solution of a very few problems in colour within the boundaries of its frame. Once painted, moreover, that scheme, harmony, symphony, or whatever that artist may call it, remains fixed and unaltered."<sup>1</sup>

Concurrent with the Impressionists' investigations of painting technique, a philosophic revolution occurred in the sciences, which introduced new information reinforcing previously unresolved

artistic theories. In 1905, Albert Einstein published his *Theory of Relativity*, modifying the Newtonian idea of time and space. Einstein showed how the interpretation of these elements depended upon the motion of the observer, while Henri Bergson's philosophy in *Creative Evolution* (1907) focused on the problems of existence in terms of time, motion, and change.

Recent developments in kinetic art have necessitated a reevaluation of Thomas Wilfred's contribution to twentieth century art. The basis of kinesis is the organization of time and change, concepts essential to Thomas Wilfred's art. Until recently, historians had traced the development of the kinetic movement from Futurism to Marcel Duchamp, Dada and Jean Tinguely—without ever placing Wilfred in the lineage. Since the early 1960s, Wilfred's contribution to kinetic art has been recognized, and his work is viewed as an important influence on those contemporary artists whose concerns are the use of incandescent light and physical movement.

Lumia is Thomas Wilfred's name for a visual art that utilizes light as its medium of expression. Since Aristotle, theoreticians have tried to associate light and color waves with sound vibrations. These investigations of "color music" and "mobile color" from the seventeenth through the nineteenth centuries had no scientific basis because they were dependent on the personal preferences of synesthesia. Lumia replaces earlier names designating an art of light.

Wilfred defined the basic ingredients of lumia as form, color, and motion in a dark space. Of the three, he considered form and motion the most important elements. Wilfred's main goal was



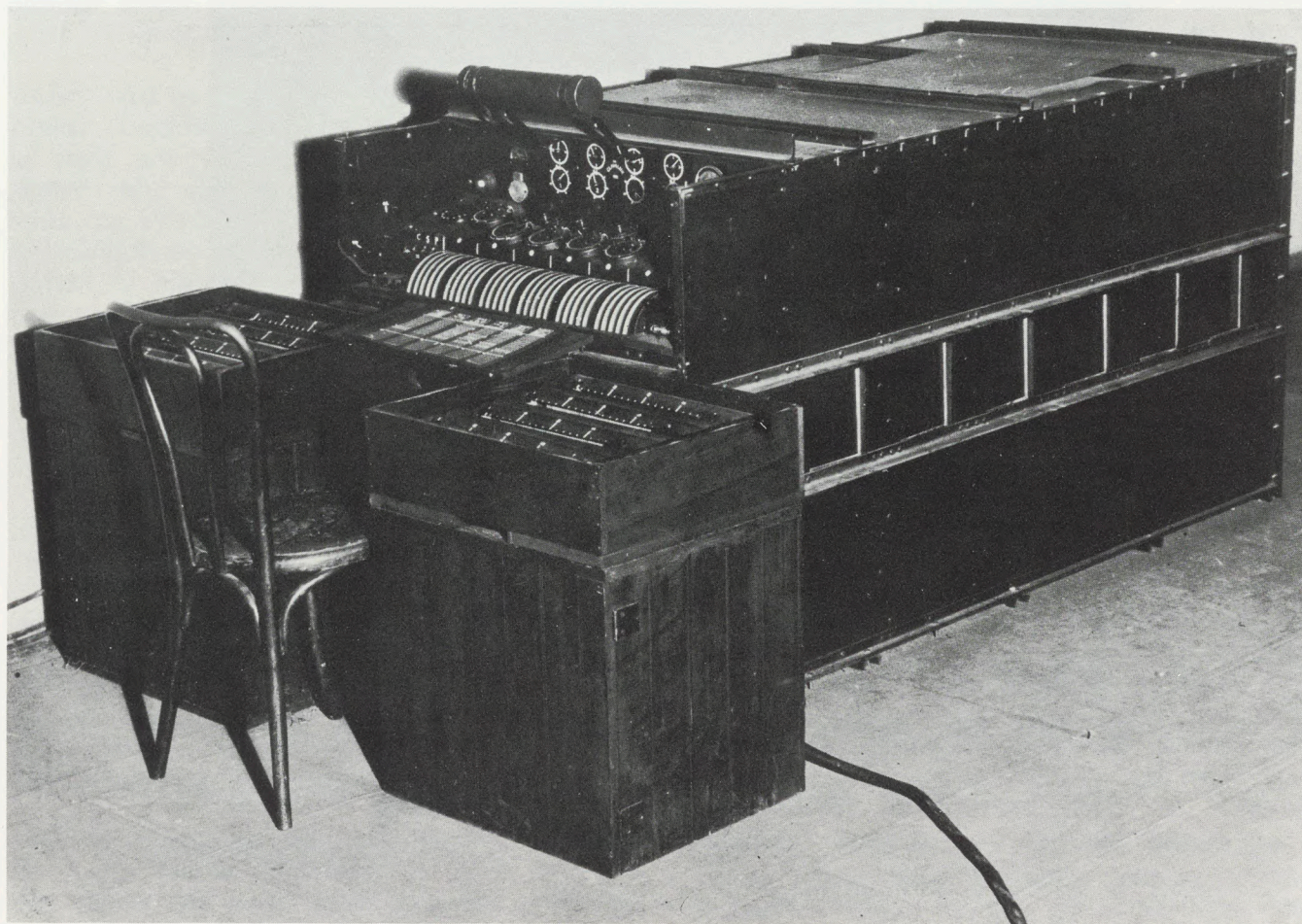
to add the missing third dimension to a flat screen, and to perform it so convincingly that the screen became a large window opening on infinity.<sup>2</sup> The most significant original contribution of lumia is the addition of a fourth dimension—time. The perception of time is affected by the interaction of memory and expectancy, structurally dynamic qualities in lumia.

Art historical distinctions specifying the differences between the “plastic arts” which exist in space — painting, sculpture, and architecture — and the “temporal arts” which exist in time — music and poetry — are no longer appropriate classifications for developments in contemporary art. Lumia, like dance and drama, is an integral

space/time art.

In 1919, after fourteen years of experimentation, Thomas Wilfred made his first successful instrument, the clavilux, naming it after the Latin meaning light played by key. Wilfred’s ideas for the clavilux and lumia were dependent upon modern advancements in electrical and mechanical research. Technology has freed the artist by expanding the possibilities for his creativity. The clavilux is one of the earliest examples of this freedom — a creation unifying art and science.

In a clavilux, a keyboard controls form, color, motion, powerful light projectors, and optical units, such as condensing lenses, filters, and discs. These components are enclosed in a large metal



CLAVILUX





Thomas Wilfred at the Clavilux Keyboard

box. The front of the console box has a long door, which, when opened, has apertures, all of which focus on a single screen. The simplest clavilux consists of at least four projection units, each regulating a different function. Registers permit the coupling of one or more of the projection units to any of the manuals. At the other end of the instrument is the keyboard, which is a complicated arrangement of keys and dials that control the images. These can either be attached to the projection unit or placed at a distance. These keys and dials are arranged in tiers which slide in grooves through one hundred degrees of grada-



tion. "Three keys, therefore, [can] present a million combinations."<sup>3</sup> Pressure is not applied as in a musical keyboard. The projector is activated through speed and distance of key movements. There is a master key for intensity, which turns on a large incandescent lamp and controls its strength. The light then passes through a condensing lens into a section where the formless beam acquires shape and character. Forms are activated by depressing the motion keys. Color is produced by the filters and refracted light introduced into the beam in front of the form and motion sections.

Thomas Wilfred employed four basic projection principles in his lumia instruments and related projectors.

1. *Direct Beam*: Light travels directly from the source in the lamp house to the screen. Color and form elements, either static or moving, are interposed at various distances from the source. The closer these elements are to the source, the more diffuse the image appears; the farther away these elements are from the source, the sharper the image becomes.

2. *Reflection*: The light source is located near the screen and the beam is directed toward one or more reflecting surfaces, which are moved in programmed rhythmic orbits. The reflector surfaces are curved progressively and determine the formal nature of the composition. By reflecting the light beam, changing and moving forms are created.

3. *Focal Stage*: Light rays from the source are channeled by the condenser lens into parallel paths. When the rays reach the objective lens, they converge at a nodal point, where they reverse and travel to the screen. Three-dimensional settings of varying degrees of translucency are moved between the two lenses. Color is introduced into the beam in front of the objective lens.

4. *Focal Plane*: This is a modification of a lantern-slide projector, which includes a source for the light, a double condenser, a focal plane, and an objective lens. Instead of a lantern slide, prepared elements of form and color can be moved close to one another in the focal plane of the system; in order to achieve diffuse effects, the prepared elements are moved outside of the focal plane. Distinct and sharply-outlined forms can be

effectively produced by this method. Movement of form and color elements are controlled from a keyboard.

In addition, Wilfred also utilized the following projection devices: *Moving Filament*, an incandescent filament projected through a swinging lens; *Uniplate*, a conventional stereopticon, containing a lamp, condensers, a glass slide, and objective lens; *Multiplate*, three or more large plates moving in focal plane; *Swinging beams*, expanding form plates and swinging mirror; *Multibeam*, cylindrical lenses multiplying interposed form elements; and *Field*, projection of formless and diffused light and color. All of these projection methods can be used individually or in combination; two or more principles can be incorporated in a single instrument.

Beginning with Model A, Thomas Wilfred built several variations on his first clavilux. Model A, used from 1919 until 1925, was the entire installation and keyboard in the Huntington, Long Island studio-laboratory. The large keyboard, eventually a museum display for The Art Institute of Light, was finally destroyed when the recital and research facilities at Grand Central Palace were vacated in 1943.

Wilfred began building Model B after the Lewishohn sisters offered to sponsor his first public recital. Model B, a portable clavilux, was utilized from December, 1921 through the summer of 1922, when it was dismantled. The front of the 6 x 3 x 3 foot steel box had four projection openings in the center, each equipped with five double glass color filters controlled by thin steel wires, which were attached to the rotating keys on the keyboard. These openings also had a platform upon which prepared lamp units were placed. The openings at each end held 500 watt floods for background lighting. Rheostats on either side of the lumianist controlled the intensity of the floods, while knobs over the rheostats performed lens adjustments.

Work was begun simultaneously on Models C and D in June, 1922. By this time, Wilfred had taken out the first of several lumia patents, which described his projection principles and visionary ideas. These new instruments consisted of separate projection units (three for Model C and two for

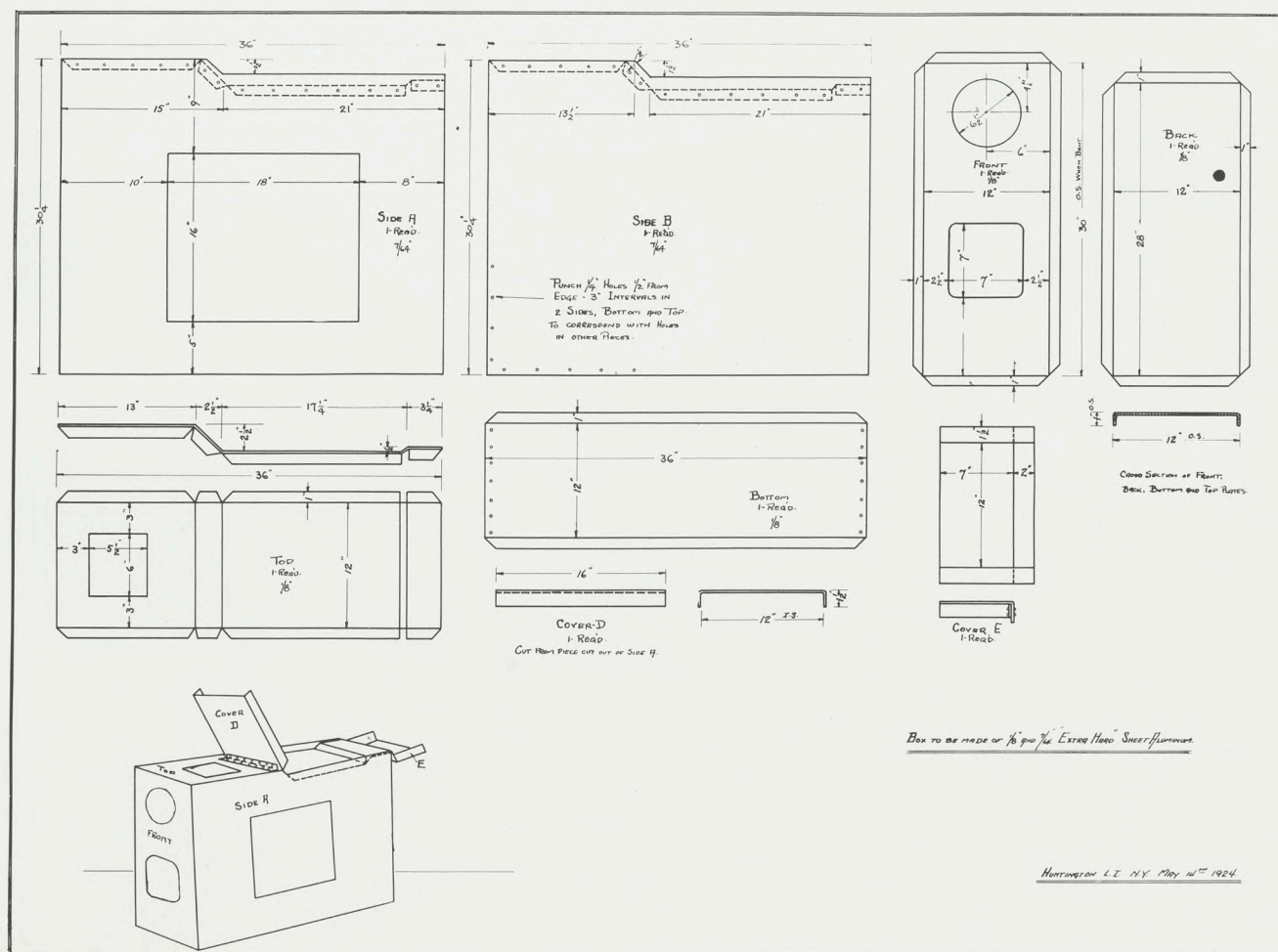


Model D) set in a steel receptacle and controlled by rotating the keys. Four detachable floodlights (red, green, blue, and white), each with shutter intensity controls, were attached to the front of the projectors and activated by levers on the key-board. Model C was used from January, 1923 through October, 1924 and in modified form at the Paris Exposition of 1925. Wilfred's assistants, George Vail and Fenn Germer, gave weekly lumia recitals on Model D.

Wilfred designed and built Model E during the summer of 1924. This clavilux consisted of four aluminum units operated by sliding keys, which replaced the rotating key found in the earlier models. Floodlights were built into the upper

front of three of the units, while the fourth on the right contained two projection systems: internal reflection on top and a focal stage with a rotor holding six settings on the bottom. This serviceable instrument was used in eighty-nine recitals throughout the United States, Canada, and Europe, from November, 1924 through November, 1934.

Wilfred built the first portable clavilux key-board early in 1927 to regulate twenty 1000 watt circuits for lamps and eight tempo controls for motors. Built into an aluminum housing similar to Model E, it was the first example of a concentrated portable lighting console that could project scenery for an entire theatrical produc-



DIRECT BEAM PROJECTOR, May 14, 1924



tion. At the time, only large backstage switchboards could choreograph theatrical lighting. First used in the Goodman Theatre for Thomas Wood Stevens' production of Henrik Ibsen's *The Vikings at Helgeland*, the keyboard was located in the orchestra pit, which gave the lumianist a view of the entire stage.

Model F, a single unit 2000 watt experimental instrument, was never completed, although some of its components were incorporated in other instruments.

Model G, built at the Grand Central Palace laboratory during the spring and summer of 1937, consisted of four separate optical systems, each enclosed in a 12 x 12 x 32 inch aluminum box. The two upper systems have interchangeable lens combinations and permanent 2000 watt lamp houses at the rear of the unit. The two lower

systems are equipped with rhythmically moving supports for various arrangements of the lamps. In this system, the filaments are used to generate form. The two-part dial keyboard is attached to the front wall of the housing; a hinged section folds into the housing for traveling and swings down to a horizontal position for playing. This instrument was used in forty recitals in the United States through 1947.

Wilfred's last large clavilux, Model H, a 1000 watt lamp house serving three optical systems, was designed and built from November, 1947 to April, 1948 for lecture-recital appearances. A flexible instrument, it allowed the artist to construct and explain the optical units to the audience during a performance. First used at a recital in September, 1948, Model H was employed for public concerts by Wilfred until February, 1966.



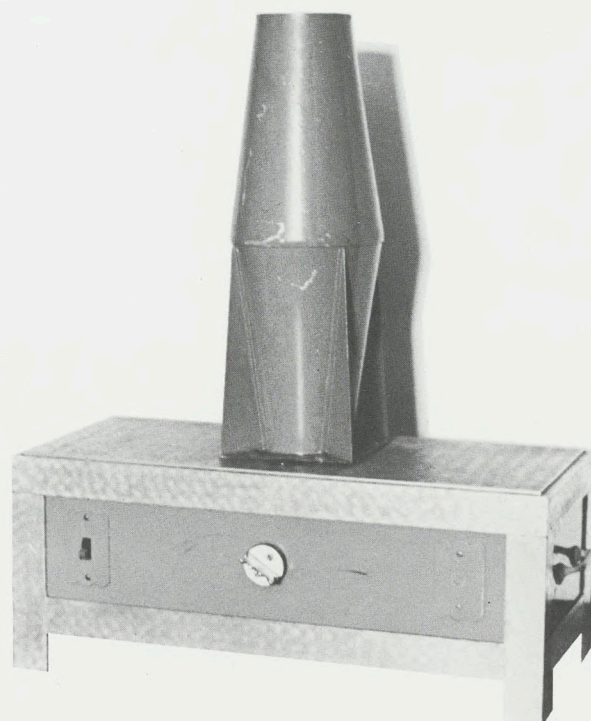
Thomas Wilfred with Clavilux Model G



Initially, Wilfred thought of lumia as an art of public performance and the majority of his compositions were composed for the clavilux. Comparatively few of these were ever transcribed from a clavilux composition to an internally programmed instrument. In 1928, partly due to the demands being placed on him by individual art collectors and his own desire to be in museum exhibitions and collections, the artist reconsidered lumia's potential. His reevaluation resulted in the development of recorded or internally programmed instruments that were completely self-operating.

Wilfred called these semi-automatic recorded instruments "Luminars." Number 36, which was the first of these "Table Model Claviluxes", was set into a cabinet with legs, fitted on top with a lamp, and designed for ceiling projection. In 1933, a reflector rotor was installed and this unit became part of the equipment for the execution of the clavilux composition "Study in Depth, op. 83." Seven luminars, #49-55, were built between 1928 and 1933. These instruments, operated by synchronized motors, included a rotating 500 watt lamp, two 9¾ inch color records on a sliding base, and a double cone internal reflector. One of these luminars, #50, included in this exhibition, has a knob which can override the automatic motors to increase or decrease the rhythm and tempo of images and color sequencing.

In 1930, sixteen of the "First Home Clavilux Models" were conceived and built (#82-97). For fourteen of these "Clavilux Juniors," as they are also known, Wilfred commissioned a furniture firm to build duo-stacked walnut cabinets, adorned with art-deco steel hinges. The upper section held a curved opaque screen, while the lower section housed a 100 watt moving lamp, a double cone reflecting system, and changeable color records. Units #83-97 had extension keyboards for the viewer to operate, which controlled the tempo, shutter, and three small floodlights. In addition, another keyboard dial could stop any of the factors in the composition. Two models were planned for corner installation, as is #93 in this exhibition. Unlike the other units, #82 had a round screen and was installed in a small cabinet and #83 was designed as a colonial corner hutch. Very few examples of these semi-automatic instruments still exist. Number 96 has been adapted



FIRST TABLE MODEL CLAVILUX (Luminar) #50, 1928.

by its present owner to include references to nature; it requires careful operation to achieve compositional variations.

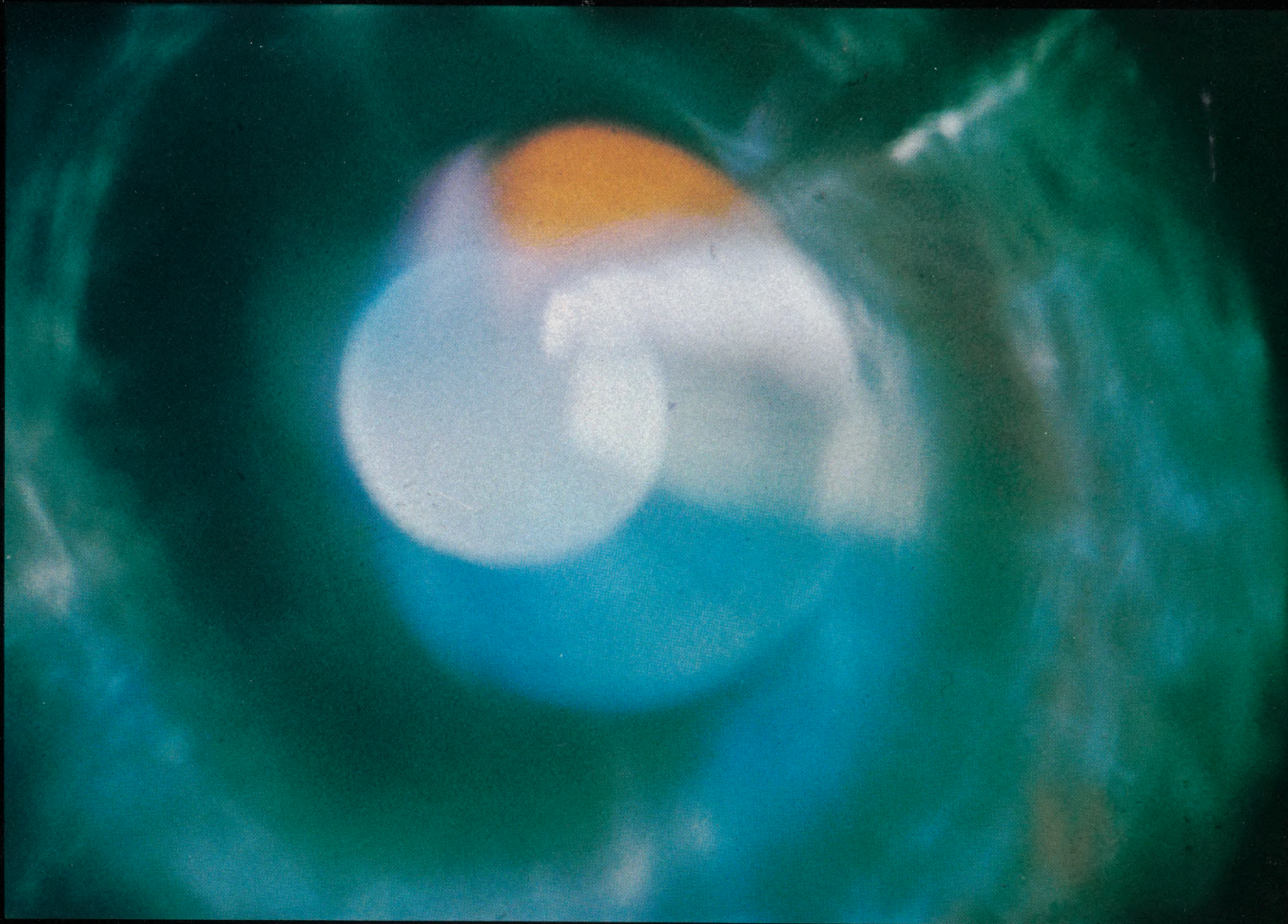
The next structural advancement in Wilfred's work occurred during 1935-36 with the introduction of the "First Home Lumia Instruments." These instruments, of which five were made (#161, 167-170; two with oak and three with aluminum cabinets), were





FIRST HOME CLAVILUX (Clavilux Junior), 1930





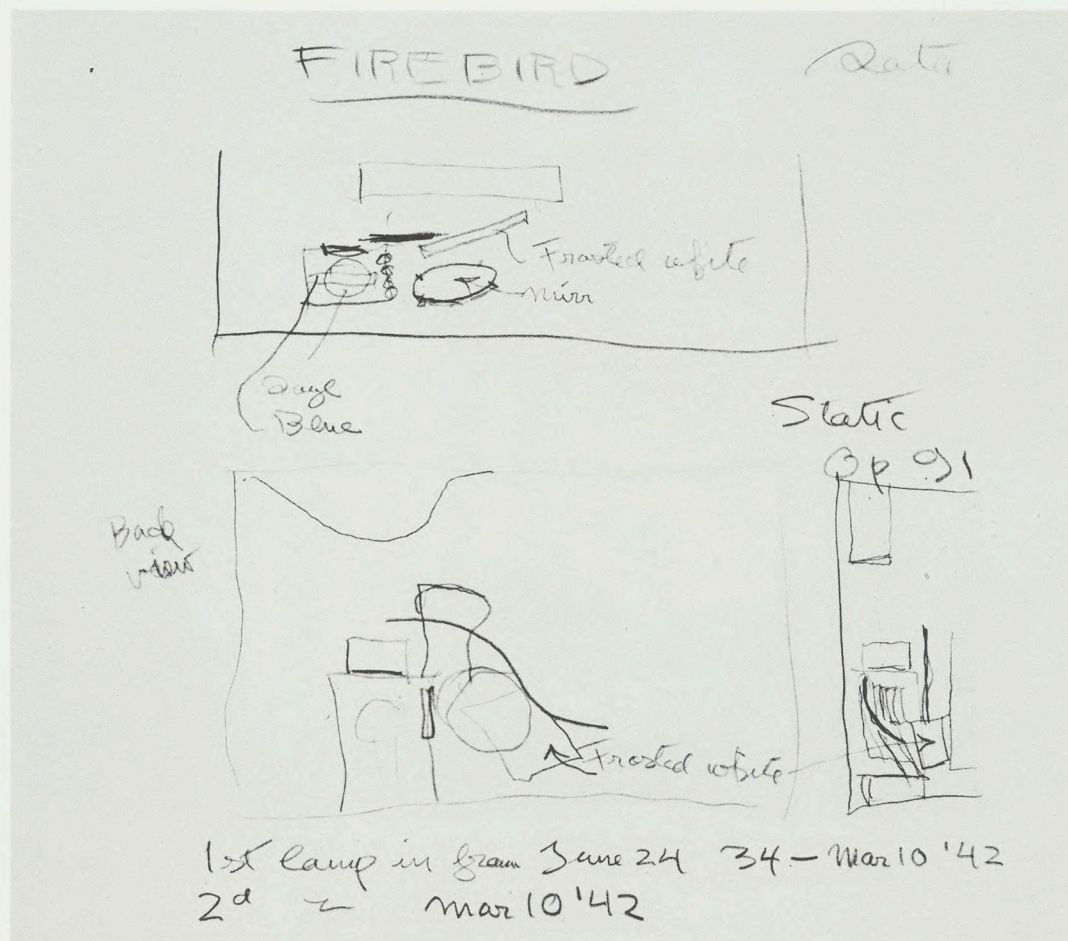
FIRST TABLE MODEL CLAVILUX (Luminar) #50, 1928



small versions consolidating elements from earlier models. These instruments have a screen which opens from the front. Inside there is a 150 watt lamp which turns on its axis and has a vertical projection capacity, shutters, and two color wheels. Rising forms originate in the upper section while a selector disc is in the lower section of the unit. An adjustable horizon mask, a stationary form in front of the reflecting elements, is activated by the extension keyboard, which also controls the other internal components.

Unique and significant compositions dating from the 1930s and early 1940s show that Wilfred was working towards the standardization of his equip-

ment. "Multidimensional, op. 79," (1932), a tall narrow instrument with a small horizontal screen, has a central mechanism around which the other forms revolve, and technically is a prototype for "Orientale, op. 155" (1962). The image can be stopped to isolate any of the individual passages. "Firebird, op. 91," (1934), also known as "Abstract," is Wilfred's only static composition and most closely approximates a painting with light. No motors are used. His compositions from the early 1940s are quite different. Though all of these lumia compositions utilize a 15 inch square screen, some have static lamp units, while others have moving light sources. The cabinets are either wood or aluminum.



HISTORY OF THE FIREBIRD, op. 91, 1934



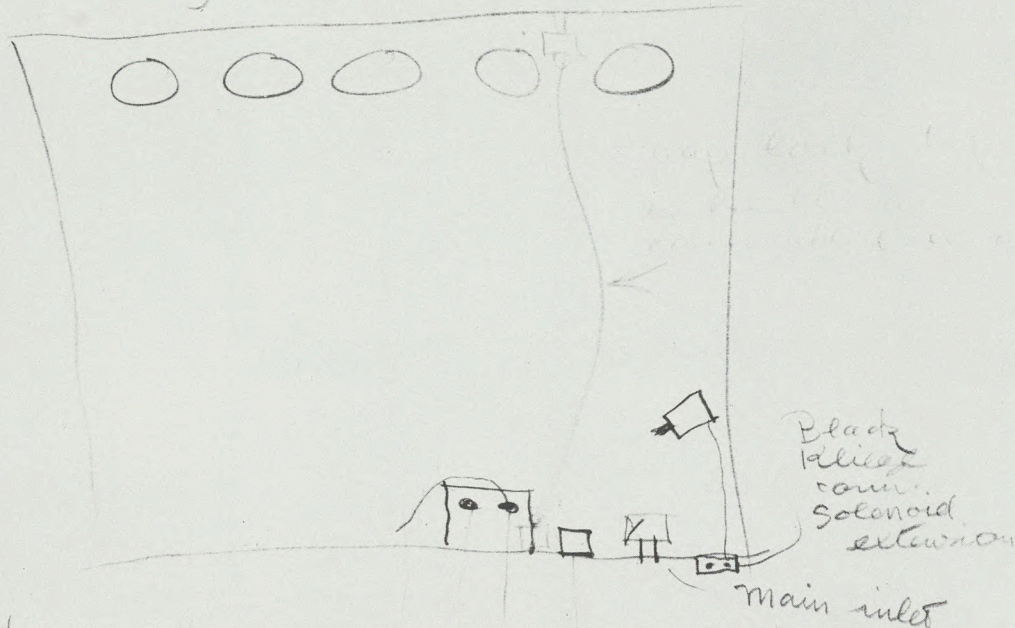
(Tranquil Op 91 Started July 23 '34)

Revs Samp 2271  
Molar 2273

# TRANQUIL STUDY

5 25 W yellow (125 W)

Auto



4 way  
switch

1 off

2 cycle

3 caution

4 yellow

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while  
cycle  
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on  
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to solenoid

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inlet

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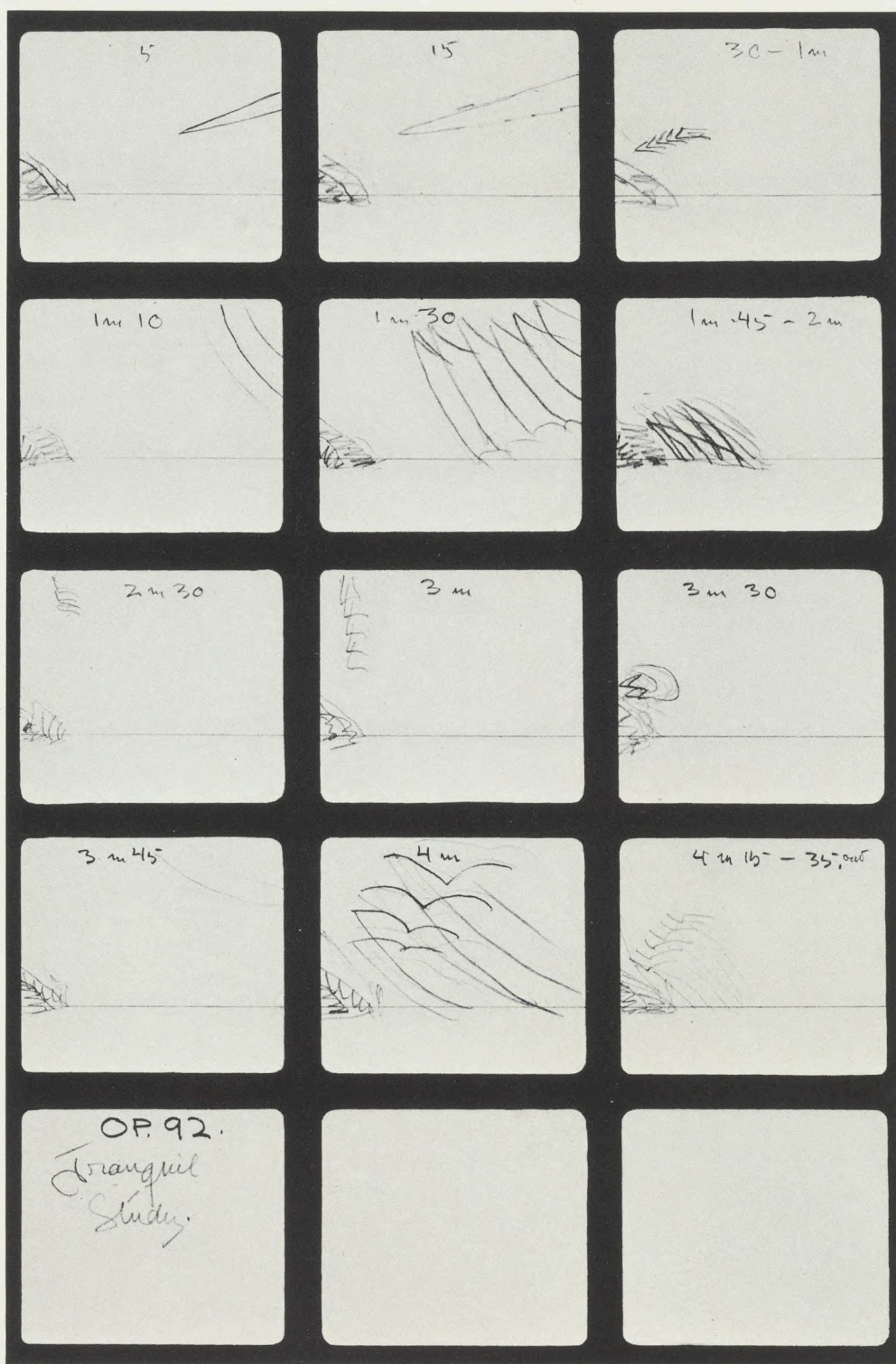
Disconnected  
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Mar 10 '42

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Tranquil June 4 '35

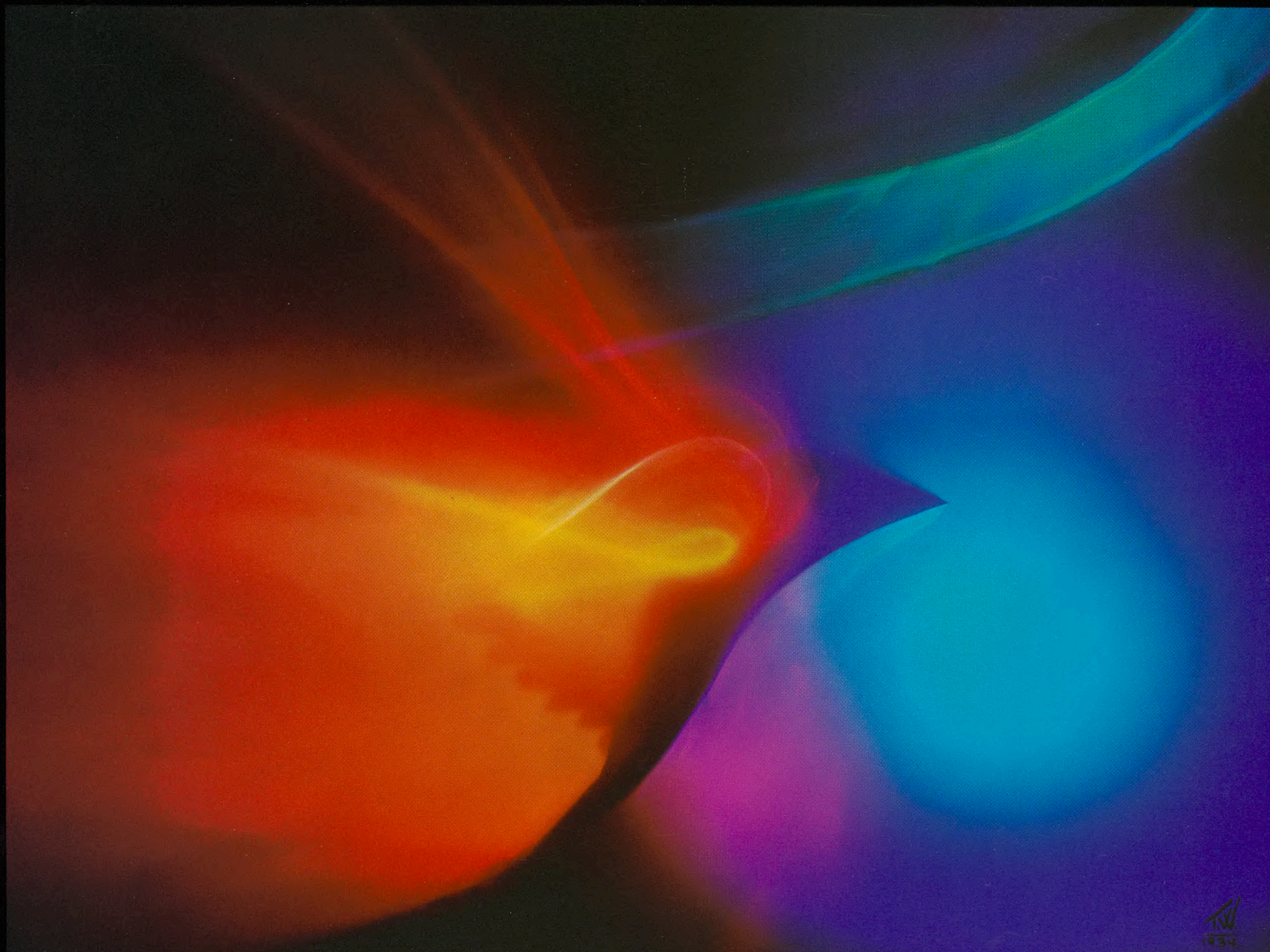
Tranquil SC Op 92.





FORM DEVELOPMENT FOR TRANQUIL STUDY, op. 92, 1935





*THE FIREBIRD, op. 91, 1934*

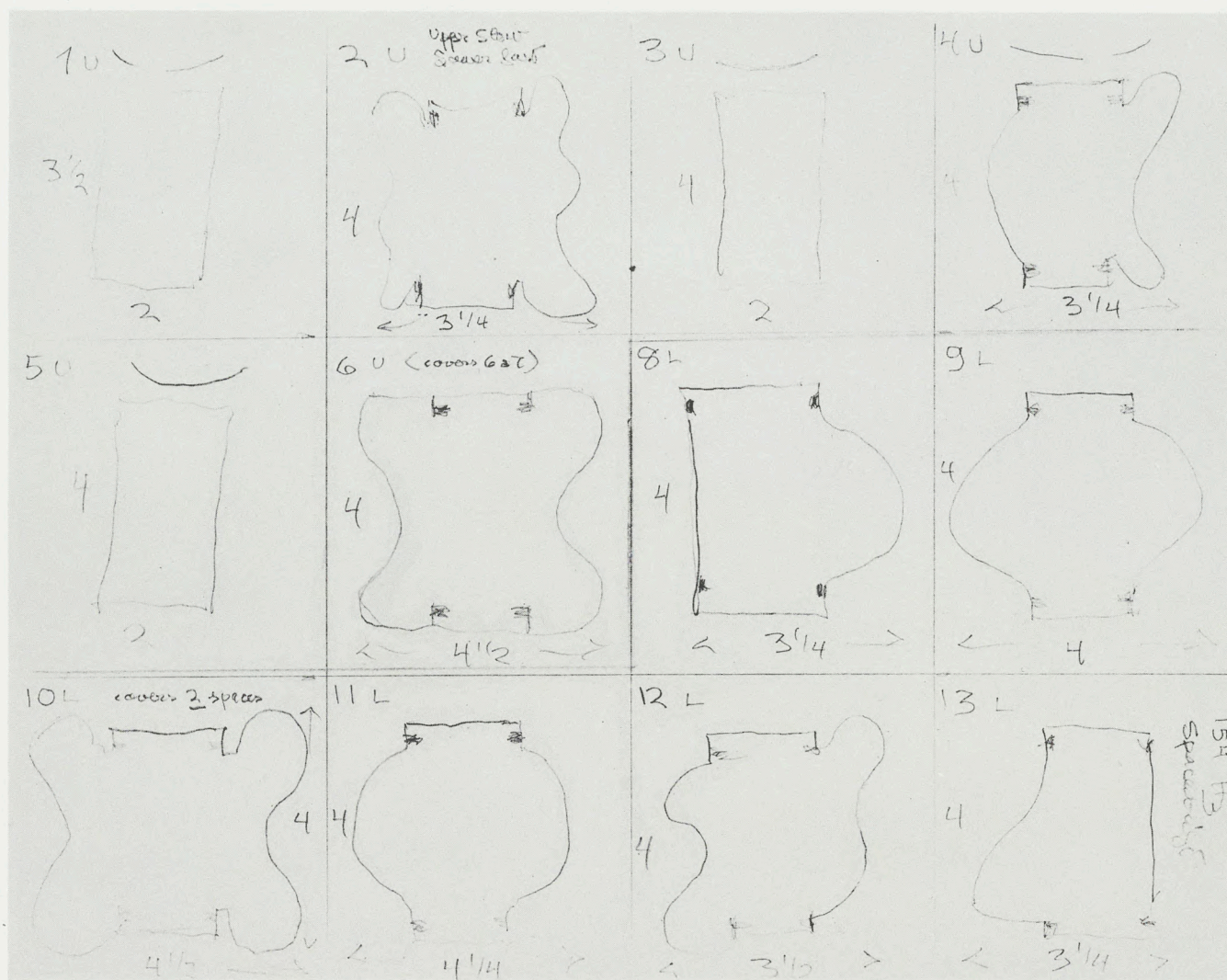






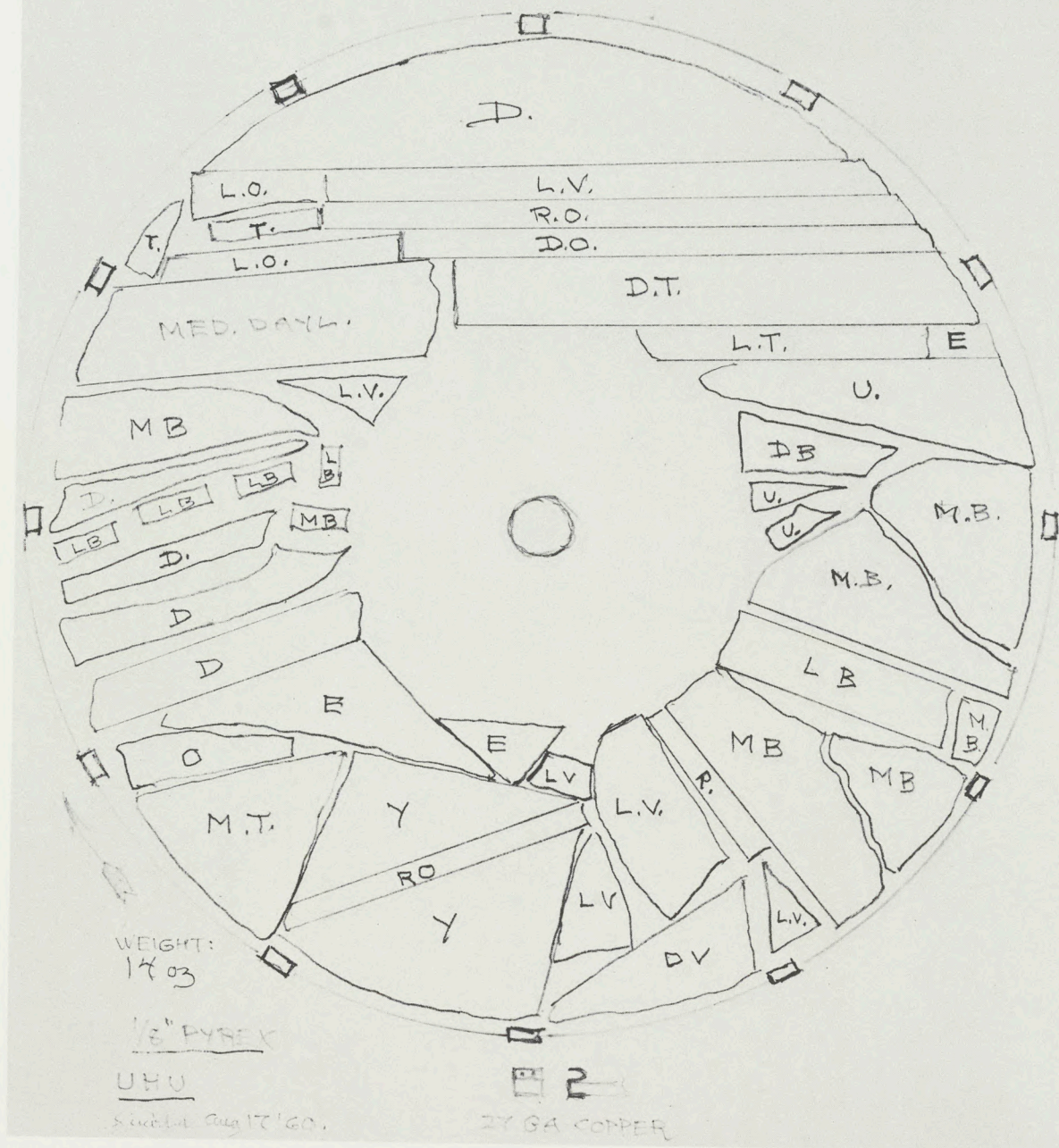
Beginning with "Ascending Forms, op. 143," (1952), Wilfred standardized the structural specifications for the internally programmed instruments. He completed seven vertical models (op. 143-147, 153, 159) and two horizontal models (op. 148 and op. 154). All of these works are enclosed in waxed natural oak cabinets. Each has a 16 x 20 inch ground glass or non-reflecting plastic screen and requires a 150 watt lamp. Wilfred used a different working procedure for these "Small Recorded Lumia Compositions." The screen was inserted in

front of the casing, which had a depth of about 10 inches. A small lamp house with openings in several directions was placed within the case. Lenses, colored glass, and mirrors (polished and shaped aluminum reflectors) intercept the color, and direct the light beams from the lamp house onto the screen. Small synchronized motors activate the movement of individual elements. Wilfred designed these compositions for intermittent playing to be viewed from a maximum distance of twelve feet.



SHAPE AND DISPOSITION OF REFLECTING UNITS FOR SPACEDRIFT, op. 154, 1960



Op 154 tb Spacing

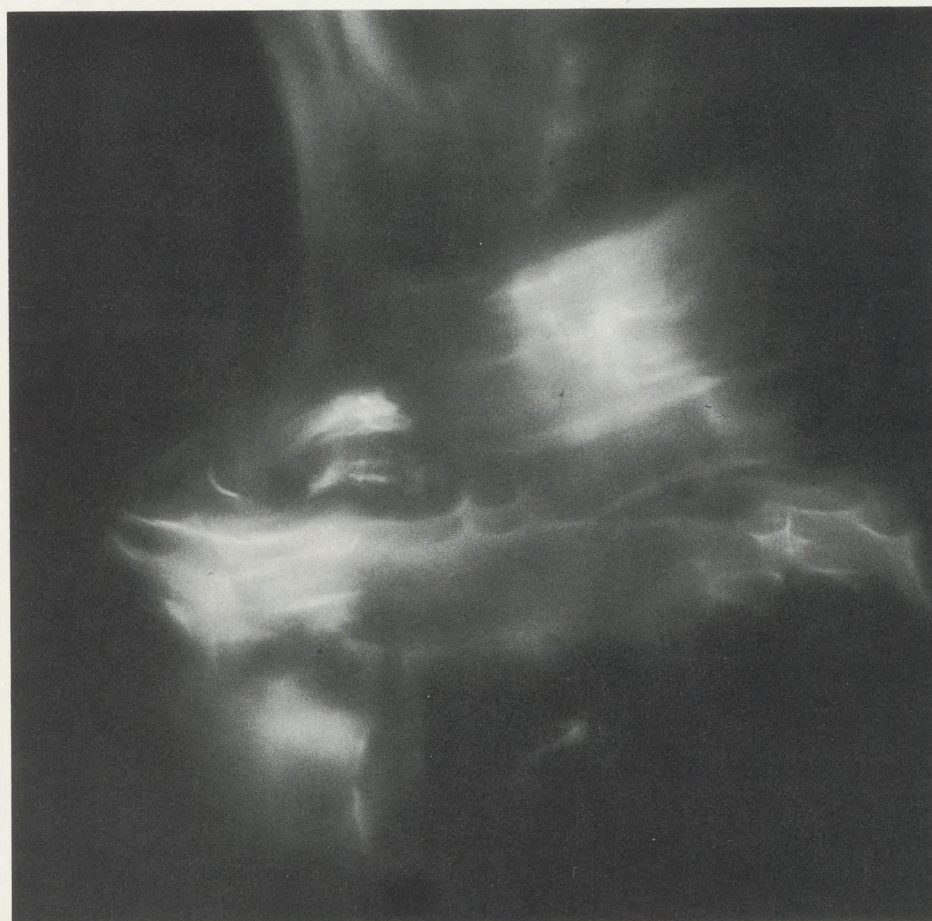
COLOR WHEEL FOR SPACEDRIFT, op. 154, 1960



In the last ten years of his life Wilfred received three major commissions—"Study in Depth, op. 152" from The Clairol Corporation, "Orientale, op. 155" from Lasalle Corporation, and "Lumia Suite, op. 158" from The Museum of Modern Art, New York. All three are complex, mural-size compositions with internally programmed instruments and represent the culmination of the artist's theories.

With the purchase of "Vertical Sequence II, op. 137," in 1942, The Museum of Modern Art, New York, was the first institution to recognize and acknowledge Wilfred's achievements. In 1963, the Museum commissioned its third and largest piece, "Lumia Suite, op. 158."

Installed in a small, separate theatre, "Lumia Suite" combines the public and private character of lumia performances. Wilfred considered this work his masterpiece and wrote to Alfred H. Barr Jr. on June 1, 1965: "From beginning to final completion, this work has been, as it were 'under a lucky star.' The vision came easily and without effort or doubt; the sequence molded itself smoothly in my mind; the instrument necessary for its performance presented no serious problems and the [museum's] gallery, which was finally selected for its installation, has proved ideal."<sup>4</sup> It is through the exhibitions at The Museum of Modern Art that a larger public has been able to view the art of Thomas Wilfred.



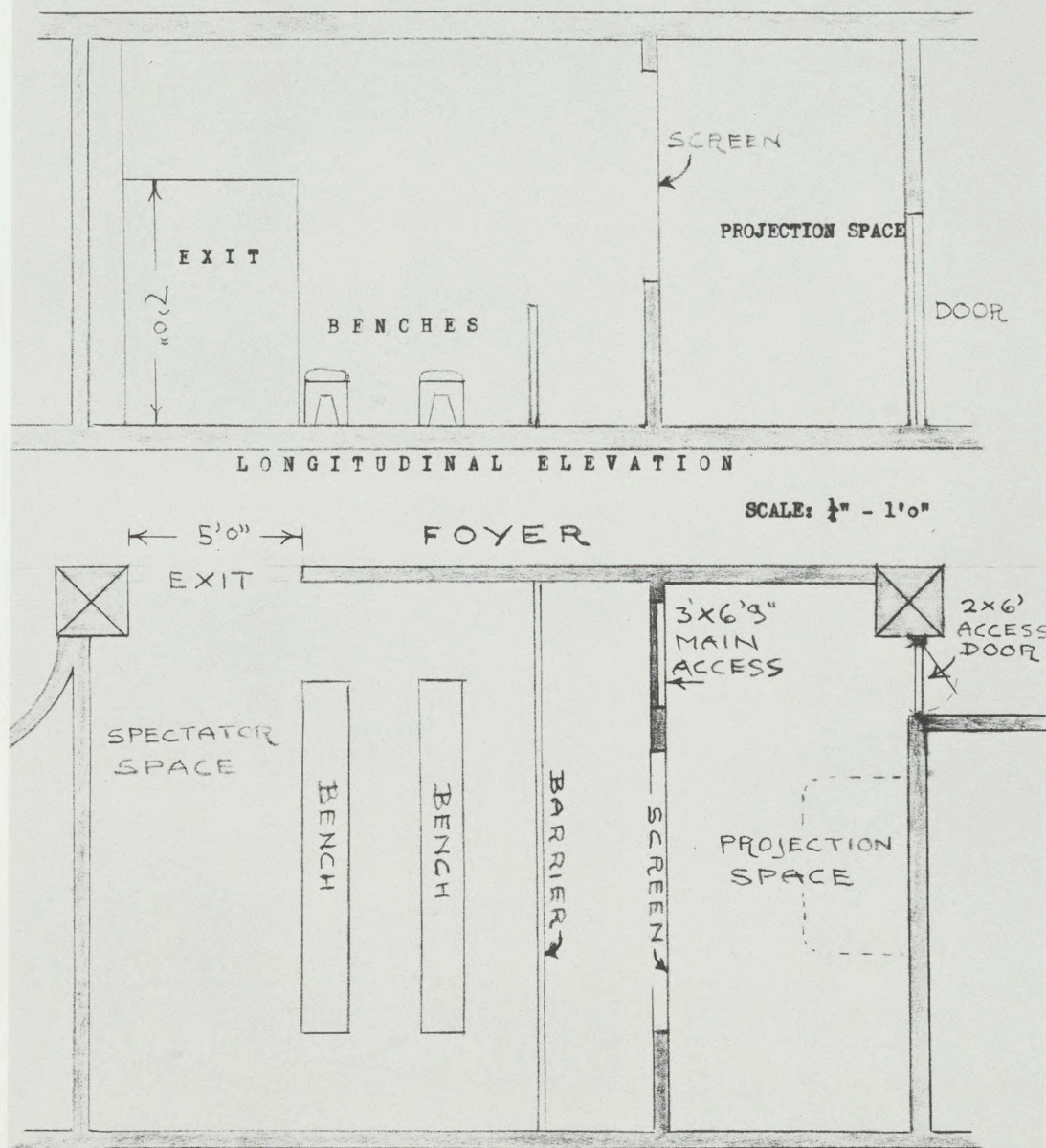
PASSAGE FROM VERTICAL SEQUENCE II, op. 137, 1941







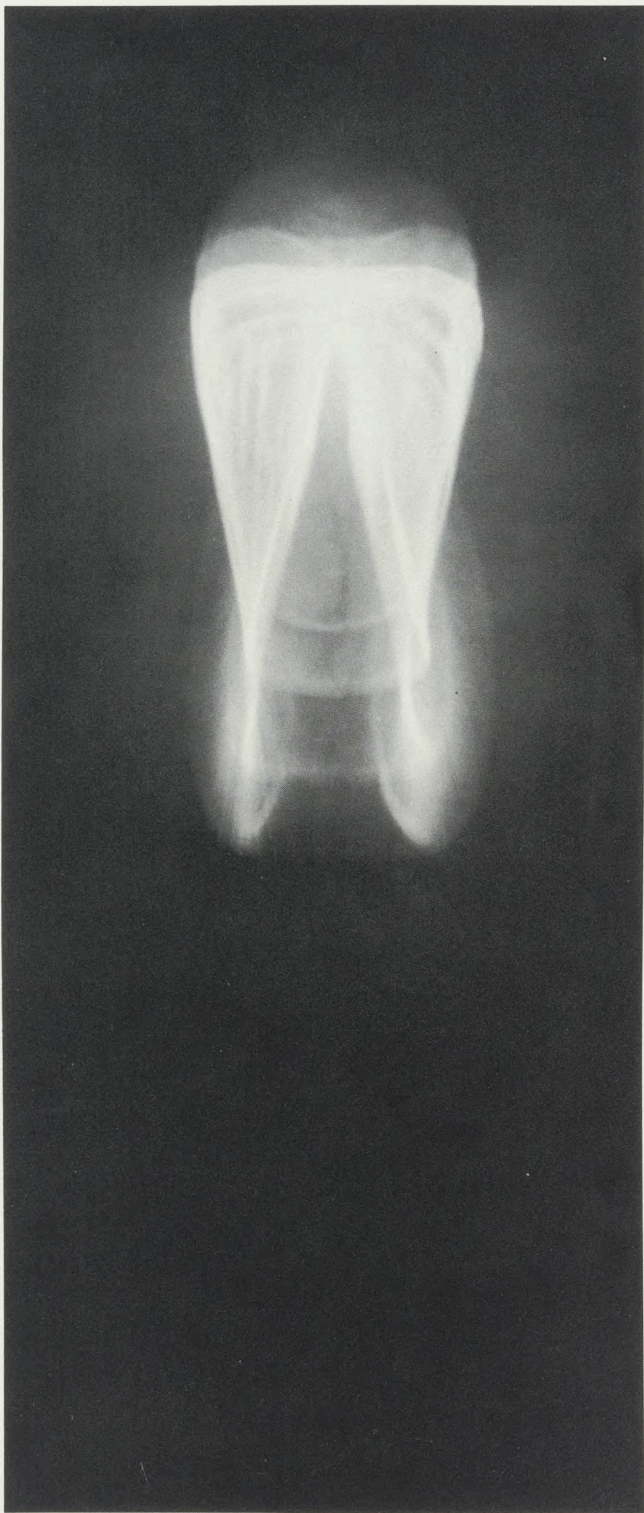
LUMIA SUITE, OP. 158. PROJECTION AND SPECTATOR SPACE DISPOSITION.



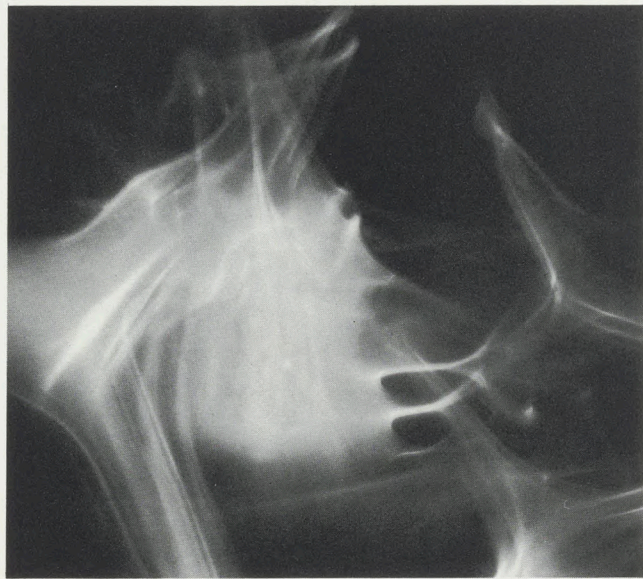
A small 2' X 6' access door at the rear of the projection space is recommended, as it will permit frequent inspection and maintenance work to be carried out without interrupting the performance. The larger 3' X 6'9" main access in the front wall of the projection space can then be a simple flush removable panel as it will be used only to move the instruments in and out of the projection space.

ART INSTITUTE OF LIGHT,  
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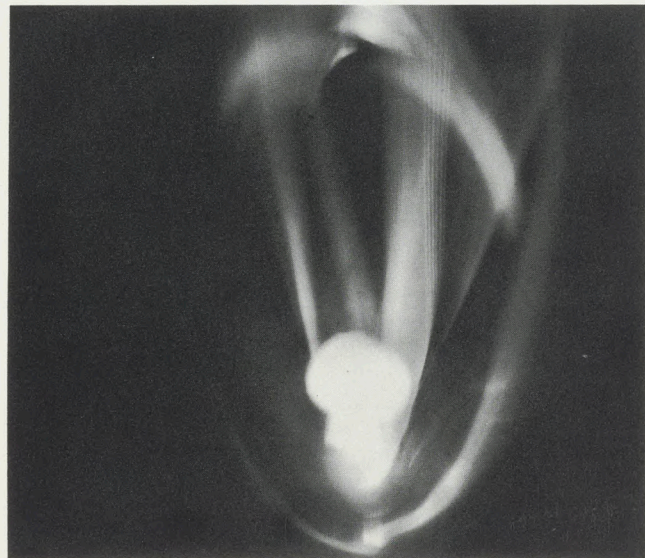




PASSAGE FROM VERTICAL MOVEMENT, *LUMIA SUITE*, op. 158, 1963-64

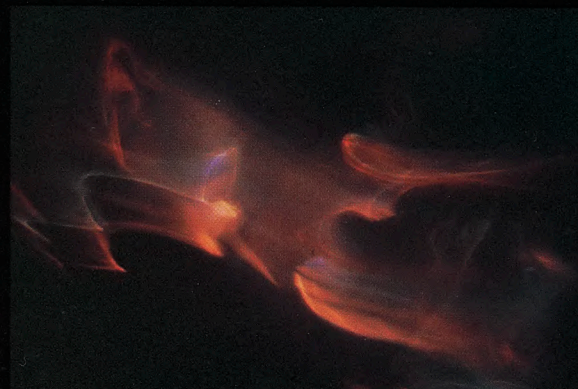
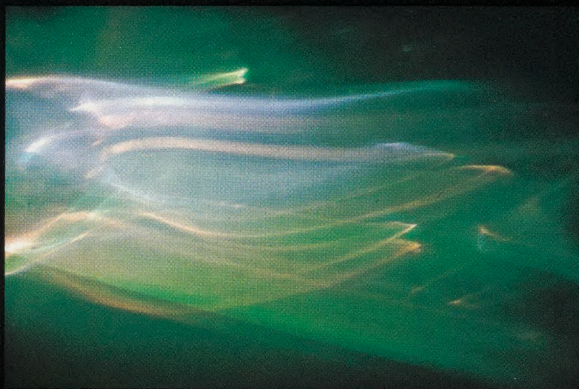
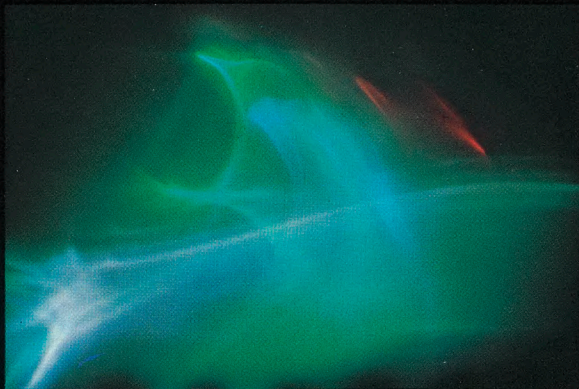


PASSAGE FROM HORIZONTAL MOVEMENT, *LUMIA SUITE*, op. 158, 1963-64



PASSAGE FROM ELLIPTICAL MOVEMENT, *LUMIA SUITE*, op. 158, 1963-64





Untitled. op, 161, 1966



Wilfred changed the size and format of the recorded instruments for his last three compositions (op. 160-162). These later instruments weave sophisticated cyclical patterns, which create complicated arrangements of form and color.

In his article "Composing in the Art of Lumia," Thomas Wilfred systematically explains the methods he employed to create an art of light. Although he never states directly what led him to this, he does document lumia's procedures and aesthetic principles of form, color, and motion.

Form is present in a lumia composition when a part of the screen's surface is differentiated by contrasts in color or texture. Wilfred defined the absence of form as a smooth blank screen surface, where the eye cannot focus on any one point. Form consists of four components: *location*, the position on the projection surface; *volume*, the amount of space occupied; *shape*, the outline created; and *character*, each form's degree of translucency.

Wilfred carefully distinguished between shape and form; shape represents the outline of an image and normally is seen first. Form can be created with light either positively, by using light itself, or negatively, by eliminating light and creating a silhouette.

Color, in lumia, is an optical phenomenon, non-existent without light. According to Wilfred, four qualities combine to produce color: *hue*, the wave length that distinguishes one color from another; *chroma*, the saturation of a hue; *value*, the percentage of white added to a hue; and *intensity*, the final strength of light reflected or transmitted through a given combination of hue, chroma, and value. Two types of color contrasts act upon the spectator in lumia: successive contrast, where the colors follow one another and simultaneous contrast, where a color chord, separated into its constituent colors, is seen together.

Motion, in lumia, applies to all visual phenomena as it relates to time. According to Wilfred, motion is the kinetic manifestation of light and has four elements: *orbit*, the entire sweep of a given motion, which is represented by a form within the screen's frame and beyond it; *tempo*, the velocity of the motion, which affects the time sequence; *rhythm* or cycle, the recurrence of forms; and

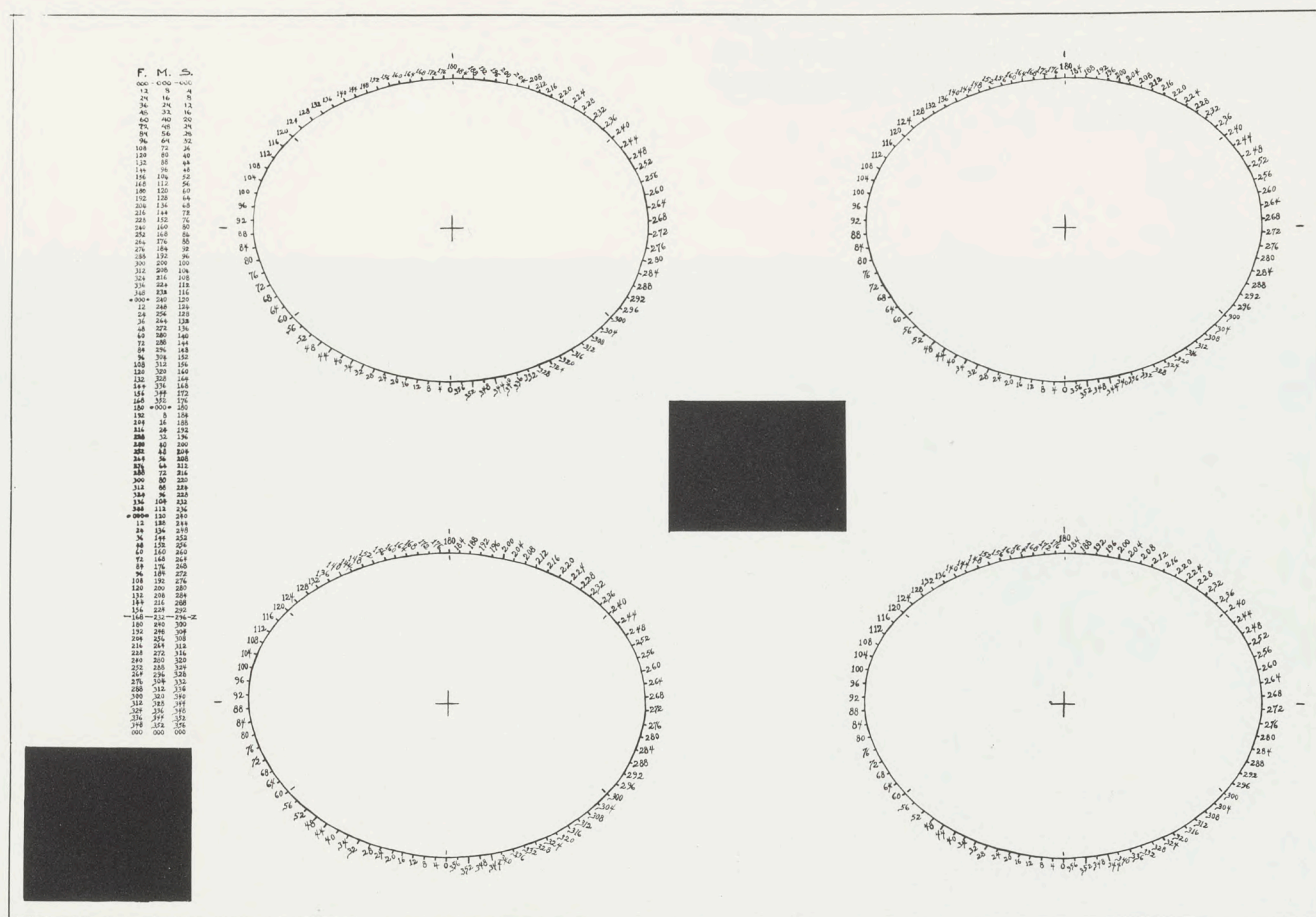
*field*, the path of form solely within the screen.

In lumia, motion is indicated by the direction the light travels, most easily seen in the contrast between slow and fast passages in a composition. Wilfred used rapid motion sparingly because it produced dizzying effects. He considered visual anchorage particularly important and stated, "When you are moving all your form elements in one direction, you should not momentarily exceed a certain critical velocity of motion without providing a relatively stable area in the field or you may cause your spectator serious physical discomfort. This applies particularly to horizontal motion."<sup>5</sup>

The principles evident in plastic and graphic compositions — unity, harmony, and balance — function kinetically in lumia. When movement is temporarily suspended in a lumia composition, the result is a balanced picture. However, the static picture's ultimate meaning can only be seen in relation to what precedes and what follows it.

In part, this explains why Thomas Wilfred refused to have his works filmed. A main feature of lumia is the absolute continuity of motion, which cannot be reproduced by film using twenty-four frames per second. In film, the "restless flicker" produced by a succession of still images destroys the restful quality which Wilfred attempted to achieve. Also, the intensity range of a lumia composition is too vast for any known reproduction process.





RELATIVE POSITIONS OF MOVING ELEMENTS AS FUNCTION OF TIME: FAST, MEDIUM, SLOW, (1928)



A typical composition contains one principal motif with one or more subordinate themes. Once chosen, they vary infinitely in shape, color, texture, and intensity. Effects which first appeared as chance and accident, Wilfred later reconstructed for use in composition.

*Lumia Suite Op 120* Completed Feb 6 1941

PINK A B C D E F G

7 motifs

1st Movement Aspiring

7 m 20

2nd Movement, Slow and Dreamy

6 m 40

3rd Movement Sively

3 m 35

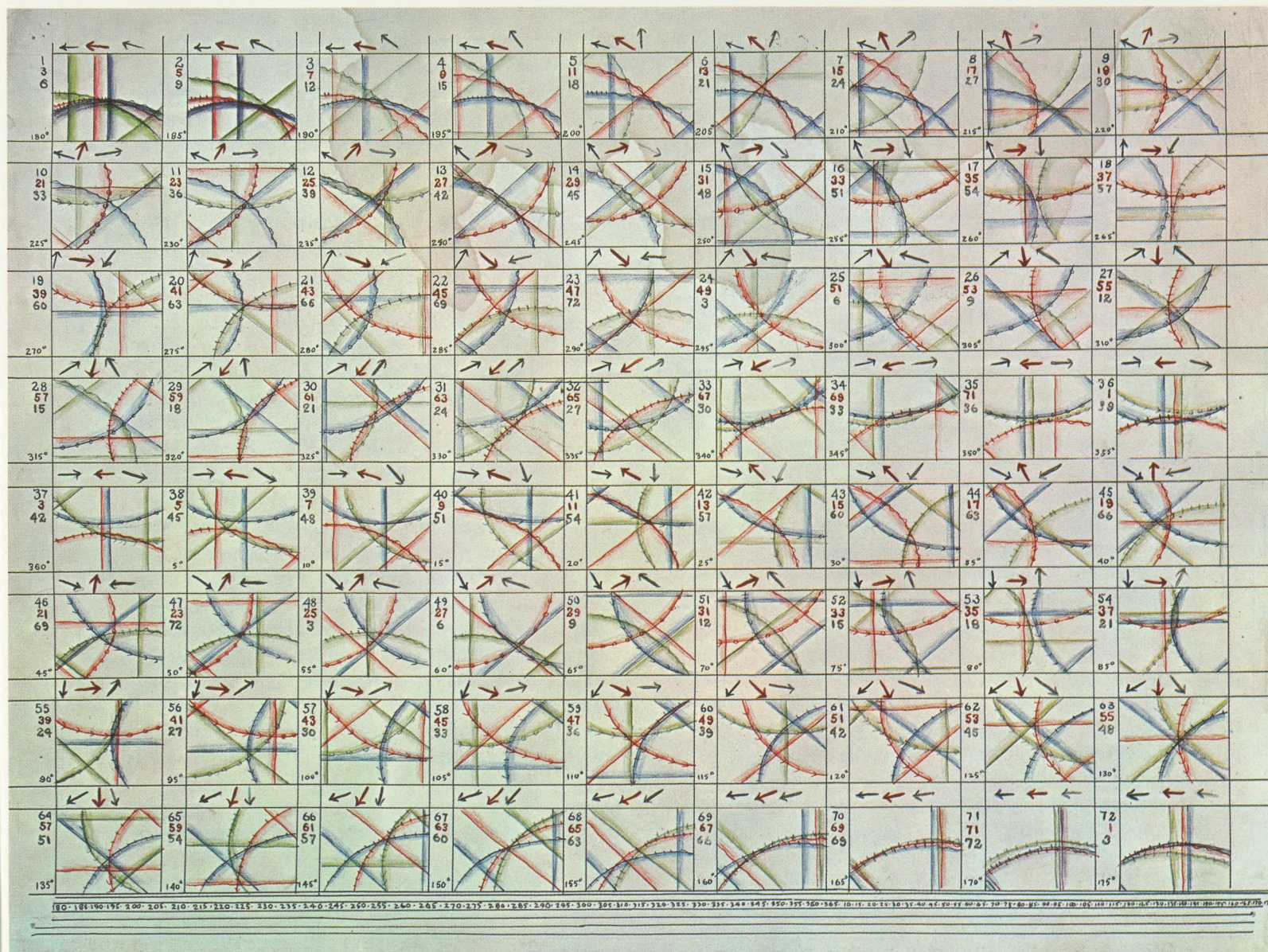
4th Movement Intense

4 m 05

First Perf Feb 7 1941. Time 24 m 18 s

LUMIA SUITE, op. 120, 1940





SEQUENTIAL DEVELOPMENT OF THREE FORM GROUPS, (1948)



Lumia's range of formal expression extends from "the purely non-objective to the starkly representational."<sup>6</sup> "The most complicated configurations seem to be achieved with the same facility as the simplest so that the compositions have a kind of analogical *continuity*, one figure flowing imperceptibly into another without apparent breaks or changes."<sup>7</sup> The figures in their evolving movements give vivid impressions of gestures, such as "reaching, sinking, fading, rising; movements that indicate release, grasp, dissolution, involution, evolution, enveloping, revealing, turning, winding, seeking, floating."<sup>8</sup> Wilfred seldom makes an effort to represent existing forms. At times, the images defy description which adds to their strangely stimulating and imaginative qualities. Nearly all of the compositions are abstract. Wilfred prefers the curve, the circle, and the parabola and his amorphous moving forms often seem on the verge of taking tangible shapes resembling things from nature, anatomy, and the urban environment. Although angular and straight lines appear, they are always secondary motifs.

In Lumia, a visual climax is achieved through volume expansion, sharpness of definition, confluence, divergence, sudden regrouping, accelerated tempo, radical changes in hue, chroma, value, or intensity, and the simultaneous use of two or more of these factors.

Thomas Wilfred devised a special notation system of letters and numbers which permitted the exact repetition of a Lumia composition on a clavilux. The letters and numbers were arranged on vertical staves, each column reserved for a different factor in composition—form, color, motion, etc. The procedure always remained the same, but the notation changed with the complexity of each keyboard and the character of each composition. Once a composition was notated, any skilled clavilux player could render the same arrangement or improvise an interpretation of it.

The first step for Wilfred in graphing and programming a composition was visualizing a space window (screen). He divided this theoretical space-stage into first field, which was the visible section of space or the screen's surface, and second field. Second field is a difficult but important aspect of Wilfred's aesthetic; it is the area, not visible to the spectator, from which the forms originate. For ex-

ample, only a small part of a single form's volume may be observed at any one time, but its extension into space, though unseen, still suggests additional space in the way that a curved arc of light hints at the sector of a large ring.

The space window may be any size provided it is rectangular and in a 10:8 ratio. Each unit of measurement is a space potentially divisible by one hundred. Although this unit of measurement is not absolute in terms of feet or meters, it bears a direct relationship to the size of each window. Each space becomes a unit of measurement in time as well as in space at a constant rate of progression.<sup>9</sup>

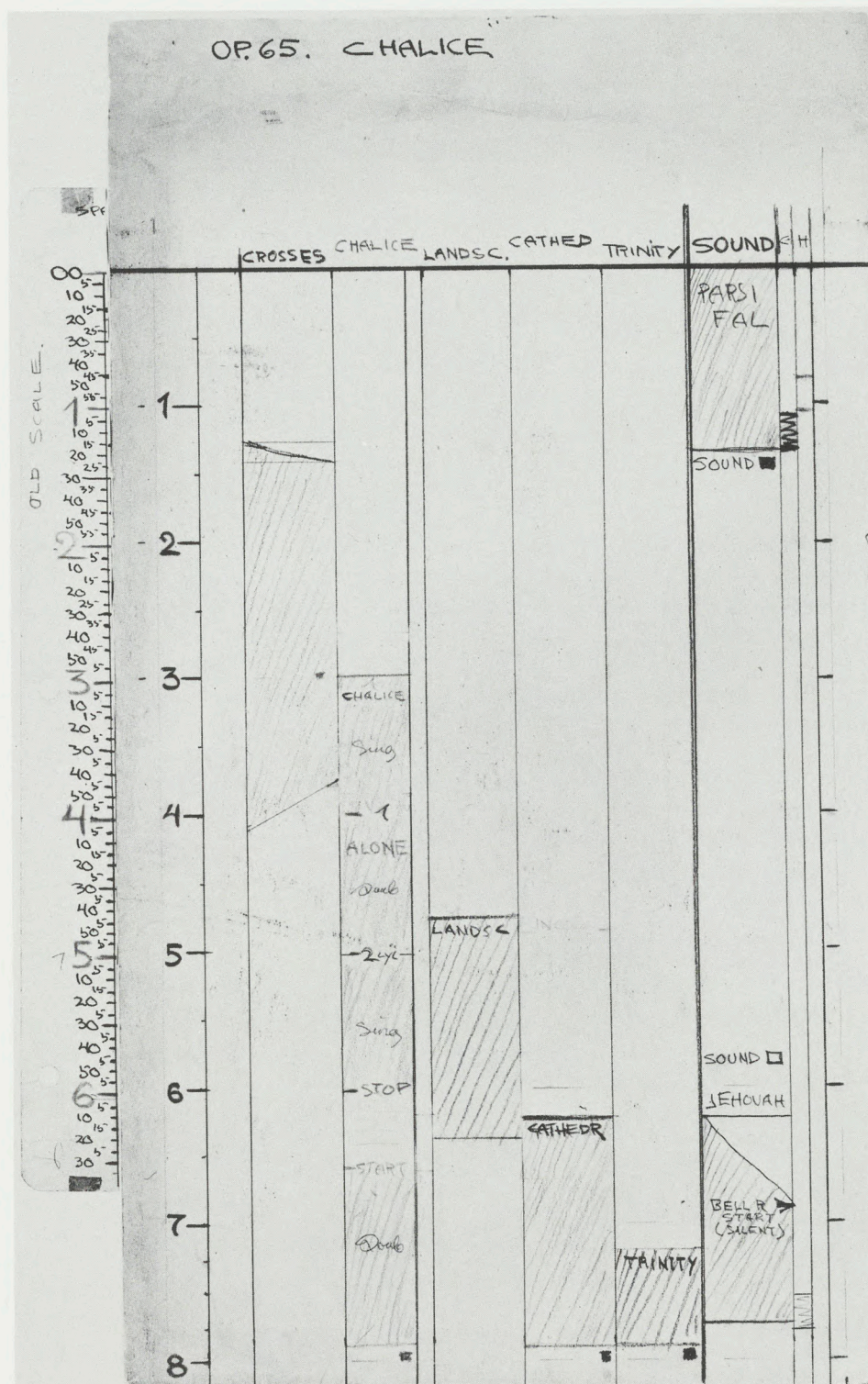
In notating a composition one can determine the location of any point on the focal plane (screen). Compositions can be charted in individual sequences and combined. Starting with zero, in the lower left corner of the screen, all measurements are made according to a definite order: width, height, and depth. All points are located in relation to zero. First field has a plus notation and requires no symbol when graphed; it is necessary to use the minus symbol for second field. All of second field must be charted because one must be able to measure and locate that which has been seen, that which remains to be seen and that which is visible at the particular moment.<sup>10</sup>

The Lumia composer creates for a spectator, who may be only the artist himself. The distance of the theoretical spectator from the focal plane is assumed to be twice the width of the screen. The eye level is equal to the level of the center of the screen. The spectator becomes the apex of the pyramidal section of first field. The main sightline extends from the eye of the spectator through the center of first field into infinity. Navigating in space, the observer is surrounded by the visual composition.

Thomas Wilfred based his color terminology on twenty-four pure hues. Each color is designated by one or two initial letters in Wilfred's notations: Yellow, Yellow-orange, Orange, Orange-red, Red, Red-crimson, Crimson, Crimson-magenta, Magenta, Magenta-purple, Purple, Purple-violet, Violet, Violet-ultramarine, Ultramarine, Ultramarine-blue, Blue, Blue-turquoise, Turquoise, Turquoise-green, Green, Green-emerald, Emerald, Emerald-yellow.

For example, the preliminary color notation in





NOTATION FOR CHALICE, op. 65, 1932



composing is: the initials of the hue, chroma/value x intensity (ie. TG 60/30 x 30%).

Since 1924, lumia has been used as visual accompaniment with music, dance, and drama. It has been projected as mobile architectural decoration and employed as an aid in psychiatric diagnosis and psychotherapy. Lumia has also served as an educational tool.

When Thomas Wilfred united the arts of sight and sound, each retained its original character. It is significant that he was involved with both music and light; his references to lumia often employed musical terminology. Yet, he firmly believed the art of light was separate from that of music. He employed music to enhance the meaning of a visual composition rather than to imitate it, although music was sometimes introduced simply as prelude and epilogue to a lumia recital. In 1926, Wilfred created his first visual setting to music for Rimsky-Korsakov's *Scheherazade*, which was performed in a series of concerts with Leopold Stokowski conducting the Philadelphia Orchestra. Each musical motif corresponded to a theme in lumia. The form and color blended as the music played. Wilfred did not follow the music measure for measure, but created an atmosphere around each movement. This first experiment left the artist unsatisfied, for he had been unable to create a visual equivalent for the aural splendor of the orchestra. Consequently, it wasn't until fifteen years later that Wilfred again composed a visual accompaniment to music. This time, however, he avoided pre-set mental images by selecting an unfamiliar score, the *Swan of Tuonela* by Jean Sibelius. His setting for it did not interpret the music, but created a visual environment.

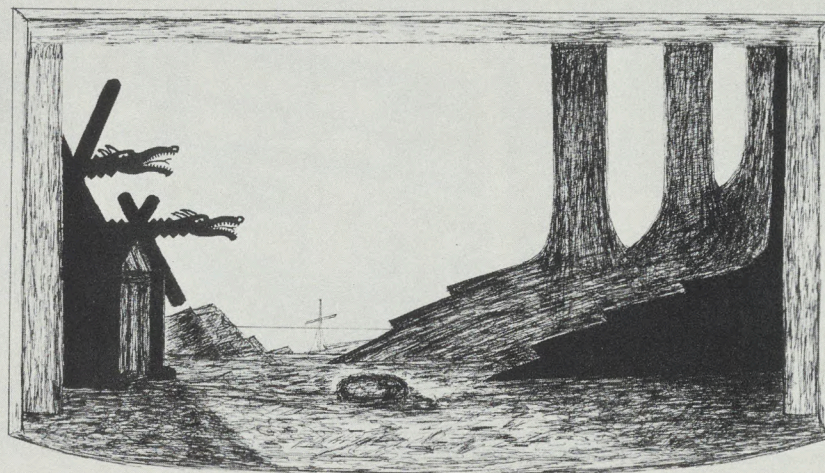
Projected settings are not new. There is evidence that this method was used in the Chinese shadow theatre as early as 121 B.C. Modern projected settings and unified control of lighting were formulated in Adolphe Appia's book *Die Musik und die Inszenierung*, published in 1899. But the more important use of projected scenery did not begin in Europe until the early 1920s, coinciding with the development of high wattage filament lamps<sup>11</sup> and the German expressionist theatre. Isolated lighting effects, such as drifting clouds or rippling water, were superimposed upon painted back-

drops and appeared in theatre and opera productions. These attempts lacked coordination and depth, and were rarely fully integrated with a production's theme.

In 1927, Wilfred designed his first projected setting for Henrik Ibsen's play *The Vikings at Helgeland*, produced in Chicago under the direction of Thomas Wood Stevens. Each of the four acts began and ended in complete darkness; forms became visible only as they became important to the play. Wilfred wrote of this effort: "After learning the lines almost by heart I began to visualize the entire performance as a continuous pictorial movement of individuals and groups and over this I built a theoretical network of sight and projection areas. Next I made an outline of the light-score with indications of the instruments needed. Only then was it possible to compose and draw basic settings—the visual units that could not be projected (simple gray and black silhouettes)."<sup>12</sup>

After the Chicago Ibsen production Wilfred remained preoccupied with problems of theatrical lighting by projected settings. He envisioned an experimental theatre, which united audience and actor through light and darkness rather than through conventional dramatic staging. He anticipated today's return to the arena theatre, where scenery is minimal and the contact between actor and spectator is active.



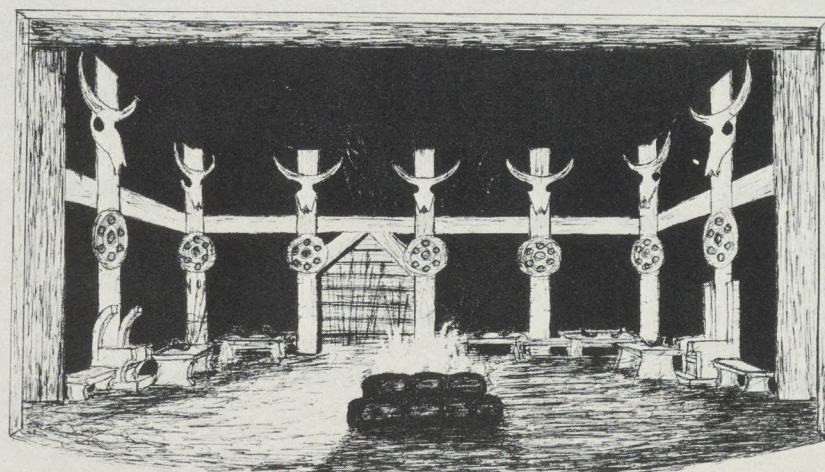


THE VIKINGS  
ACTS ONE and FOUR

A BASIS FOR CLAVILUX  
LIGHT-ACCOMPANIMENT

Thomas Wilford  
1928.

DRAWING FOR BACKDROP: THE VIKINGS AT HELGELAND, acts I and IV, 1928



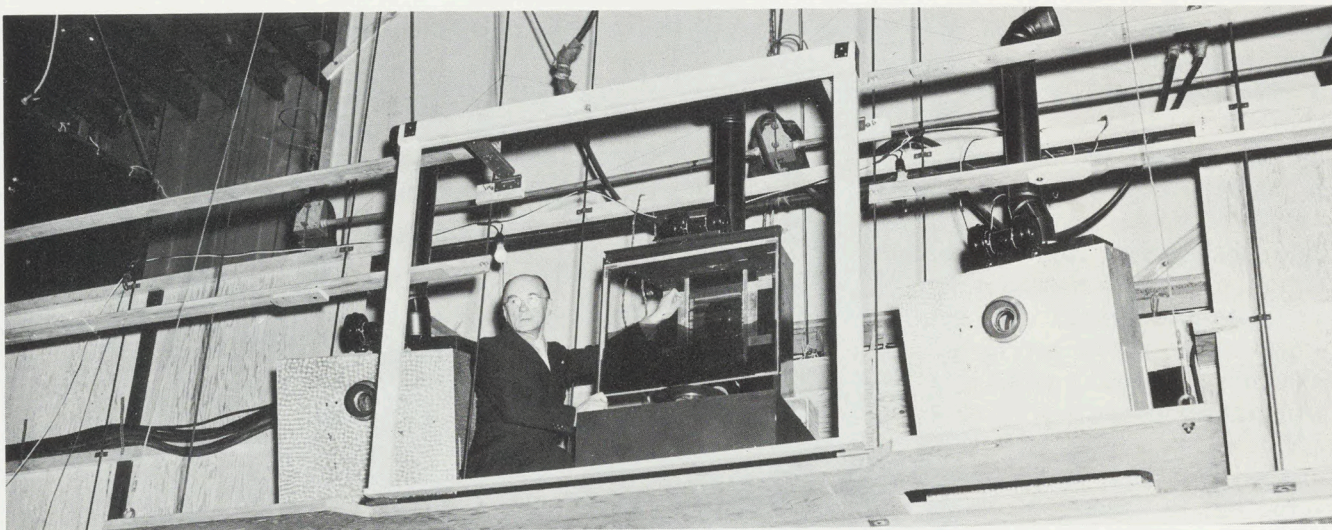
THE VIKINGS  
ACTS TWO and THREE

A BASIS FOR CLAVILUX  
LIGHT-ACCOMPANIMENT

Thomas Wilford  
1928.

DRAWING FOR BACKDROP: THE VIKINGS AT HELGELAND, acts II and III, 1928





Thomas Wilfred centering the direct beam projector at The Showboat Theatre, Seattle, Washington

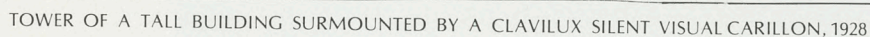
In 1949, John Ashby Conway, Professor of Drama at the University of Washington, hired Wilfred to design and build scenic projection equipment for the Showboat Theatre in Seattle, which lacked storage space for traditional painted backdrops. This venture proved so successful that Wilfred was again asked to plan the lighting equipment for two other Seattle theatres. The University Playhouse was the more interesting challenge, for Wilfred was given complete freedom to redesign the house for his projected scenery equipment. During the 1950s, several other universities commissioned Wilfred to plan light projection units, allowing the artist to refine his projector models and to prepare for their eventual mass production.

Wilfred used his diagrammatic and architectural drawings to conceptualize his projects; most, like his "silent visual carillon," were never realized, but became prototypes for later projects. The carillon was Wilfred's solution to urban ugliness. It

was to consist of a huge dome-like screen, placed on the tower of a building; lumia instruments were to project a three-dimensional light display on this screen that would be visible for miles. In 1962, Nicolas Schoffer approached Wilfred's carillon concept with his "Cybernetic Tower" (Liège, Belgium), which created an audio-visual spectacle in the night sky. Wilfred's drawings represented complete statements. His schematic drawing #806 details the suspension of a clavilux instrument in a rotunda for continuous projection of a mobile light environment. Another conceptual project which Wilfred considered was "dry fountains" of light for public parks and gardens.

Many of the drawings of Multiplate and Direct Beam units were done as illustrations for Wilfred's manual *Projected Settings*. They show an artist more concerned with exploring the concepts of a sophisticated technology than with executing works.



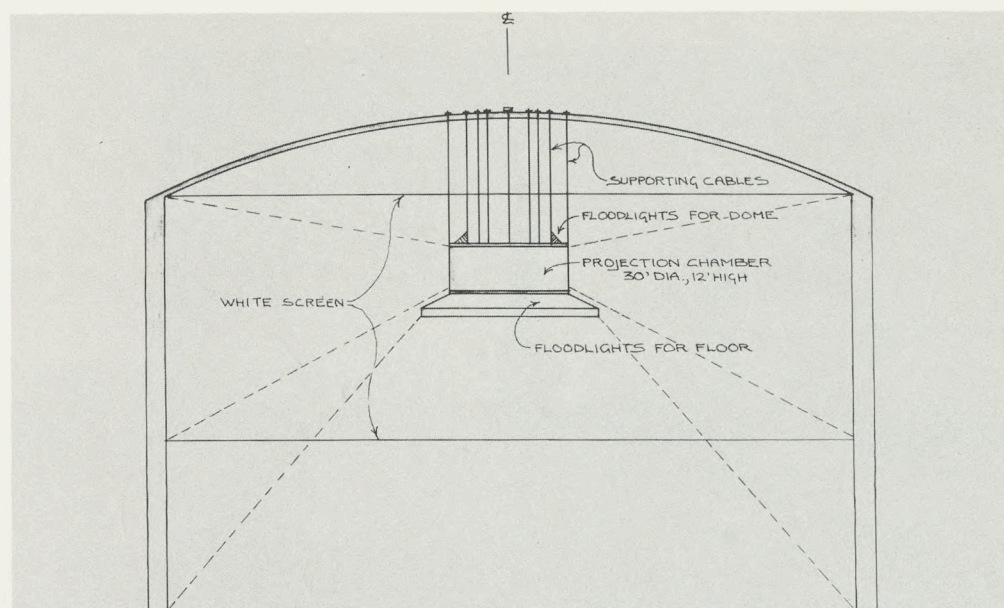






THE CLAVILUX SILENT VISUAL CARILLON, 1928



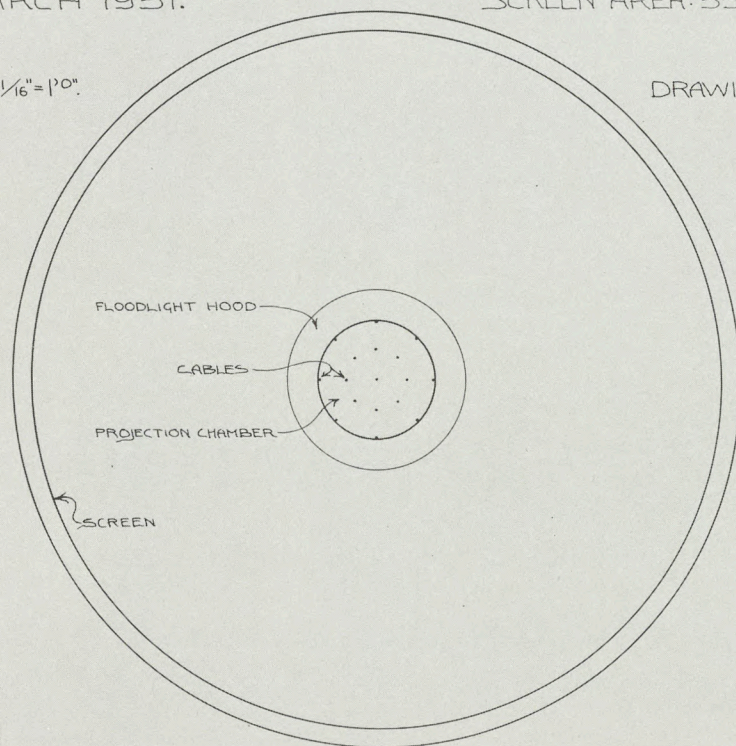


PLANNED AND DESIGNED BY  
THOMAS WILFRED,  
ARTIST IN LIGHT AND  
COLOR • 20 W. 22<sup>d</sup> ST.,  
NEW YORK CITY.  
MARCH 1931.

SUSPENDED CLAVILUX  
INSTRUMENT FOR THE  
PROJECTION OF A CONTIN-  
UOUS MOBILE MURAL OF  
LIGHT IN A ROTUNDA  
SCREEN AREA: 33.9140'

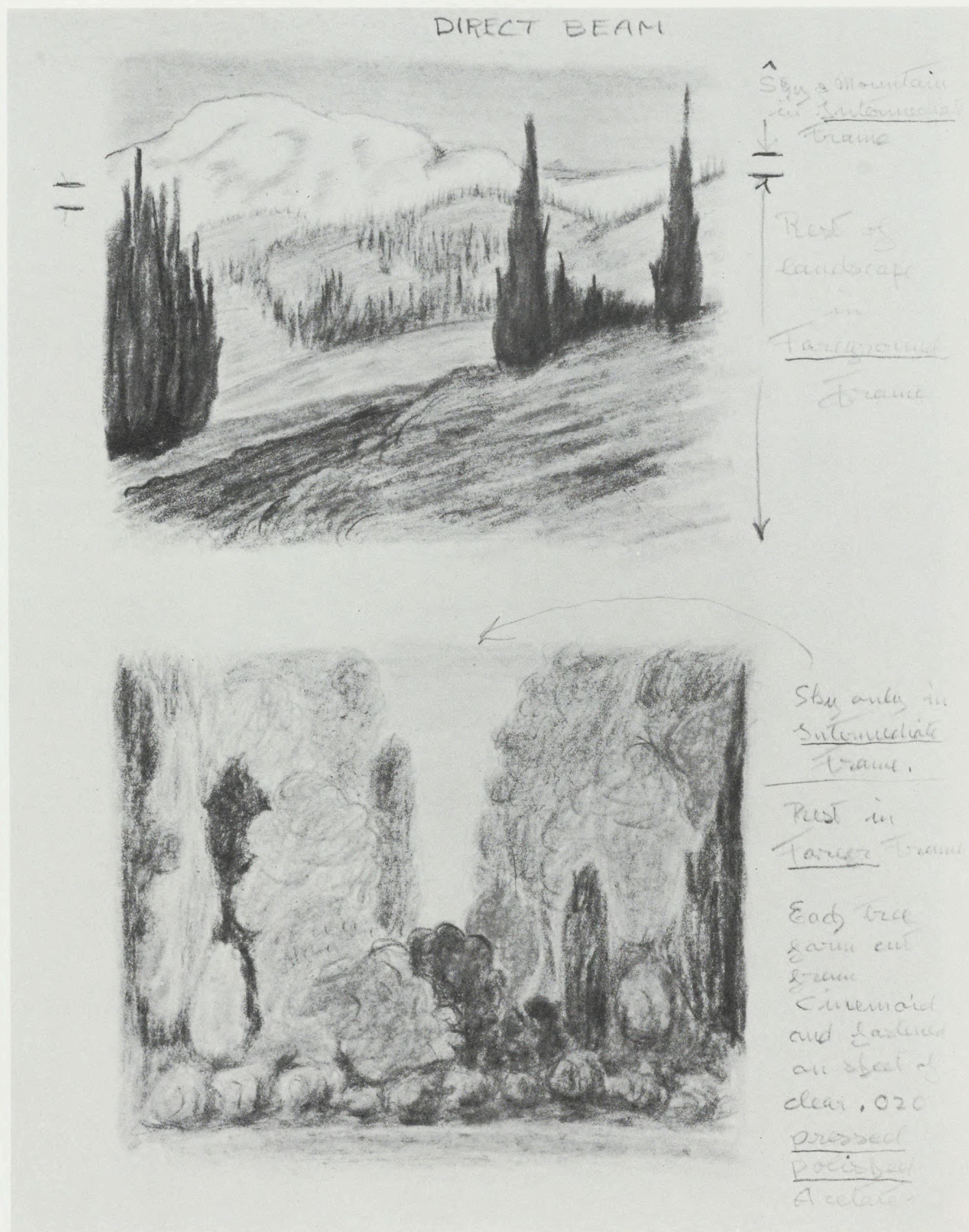
SCALE:  $\frac{1}{16}'' = 1'0''$

DRAWING # 806



SUSPENDED CLAVILUX INSTRUMENT FOR THE PROJECTION OF A  
CONTINUOUS MOBILE MURAL OF LIGHT IN A ROTUNDA, DRAWING  
#806, March, 1931





DESIGN FOR DIRECT BEAM LIGHT SETTING, INTERMEDIATE AND FOREGROUND FRAMES, (1950-57)



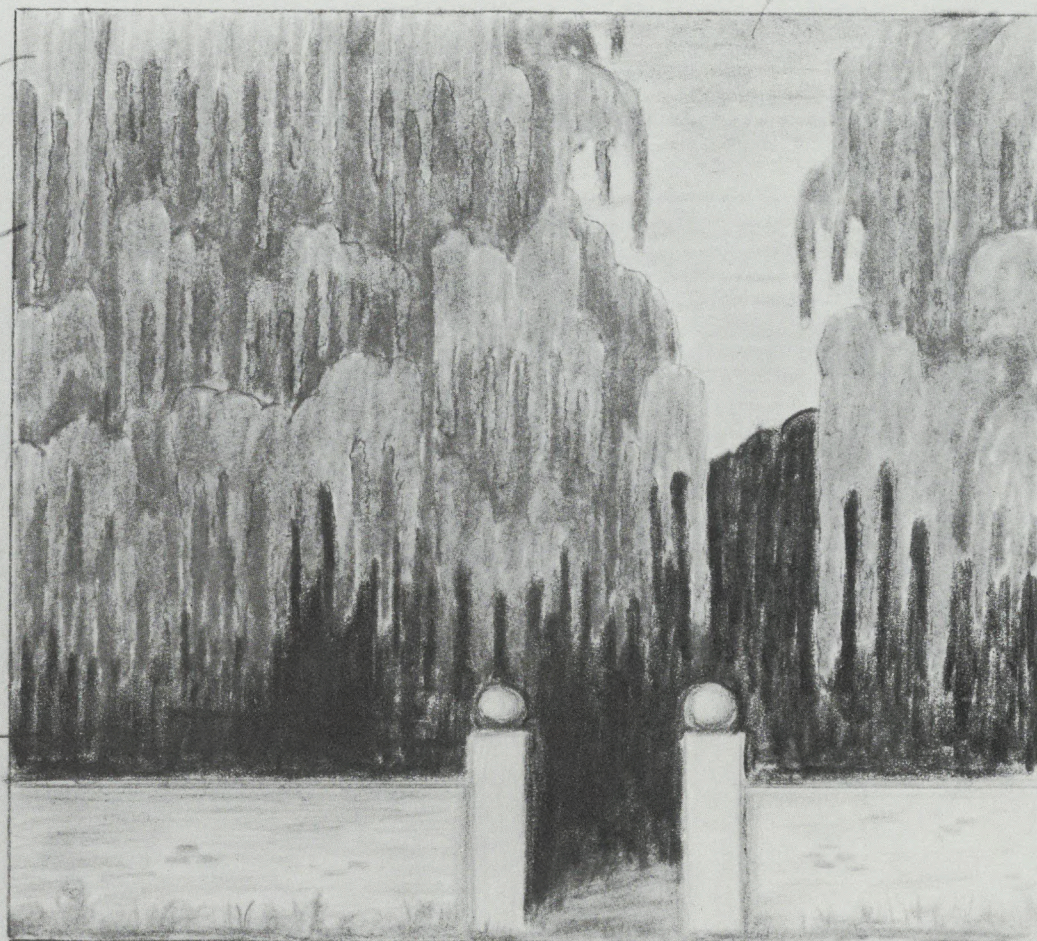
FOREGROUND

FRAME, DIRECT BEAM

Basic Toning  
under entire  
free area:  
Cinemat #21  
Pea Green.  
Darker areas:  
#24 Dark Green  
over #21

Sky:  
Successive  
layers of  
#17  
Steel Blue

#35 Deep  
Golden Amber  
over #21 & 24



Cinemat on clear plastic sheet. Binder: Utility Cement.

DESIGN FOR DIRECT BEAM LIGHT SETTING, COMPLETE FOREGROUND|FRAME, (1950-57)



Some of the ideas represented in Wilfred's drawings were eventually realized. "Orientale, op. 155," recently rediscovered at the Toledo Museum of Health and Natural History, was commissioned by the Lasalle Corporation in 1962 as an exterior light decoration. The 5000 watt, three plane focal stage instrument was housed in a special six foot tall tower, located fifty feet from the surface plane. The work was projected onto a recessed area (25 x 31 feet) of the department store building in the Westgate Shopping Center, Toledo, Ohio, where it was exhibited for a two month period. This instrument has been converted from front to rear projection for this exhibit and the screen size has been reduced for indoor installation.

In 1929, Wilfred received his first commission for an interior light mural from the Hotel Sherman in Chicago. Wilfred was asked to decorate the ballroom space by designing architectural improvements and by providing a light environment. This was his largest work, a 21 x 210 foot projected mobile mural. Suspended from the dropped ceiling, three groups of twenty one individual projectors (one group for static and two for mobile projection) covered the three walls of the horseshoe shaped screen with changing scenic murals. A concealed keyboard room in the fourth wall controlled the projection equipment, which created moods and spatial effects. Combining representational and abstract images, this versatile light mural could be an imposing Greek temple one minute and a picturesque Western landscape the next.

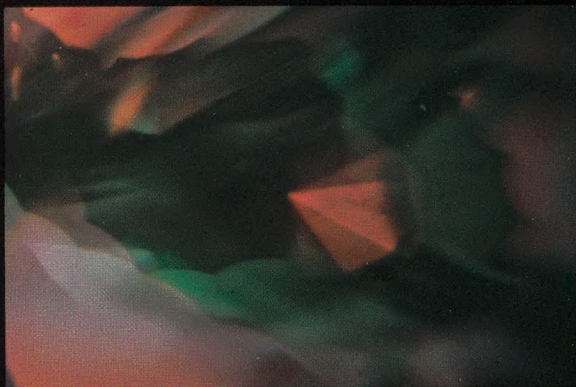
From June to August, 1939, Wilfred designed and built the "Fantascope" following the recommendations and specifications of Dr. Norman Cameron, a psychologist at the Payne-Whitney Clinic, New York City. A "mobile Rorschach test," the Fantascope was used to study schizophrenia. This machine had a self-contained cabinet, a 20 x 30 inch translucent ground glass screen at one end and a control panel at the other. Located in a wall opening, only the machine's screen was visible to the subject and interviewer. In an adjacent room the forty minute sequence of form, color, and motion was synchronized with a sound recorder. Thus, the patient's verbalization could later be identified and analyzed in conjunction with the visual development observed on the fantascope screen.

In 1959, The Clairol Corporation commissioned Wilfred to execute "Study in Depth, op. 152." This was the first lumia composition designed specifically for an office interior, and is of particular importance since it is Wilfred's first attempt at internally programming a large (6 x 9 feet) complex composition. It is the prototype for "Lumia Suite, op. 158" created four years later.

Appreciation of lumia has always been sporadic. In the 1920s and 1930s the novelty of Thomas Wilfred's ideas enjoyed wide popular support and substantial commercial success. In the 1940s and 1950s, when approval from the art world waned, Wilfred's own vision of his art sustained him. In the 1960s there was a revival of interest in Wilfred's work, but his place in the history of modern art is still assessed in terms of his clavilux invention. Yet, his sophisticated aesthetic stands as the embodiment of concepts which embrace the modernist traditions of painting and sculpture as well as music and theatre.

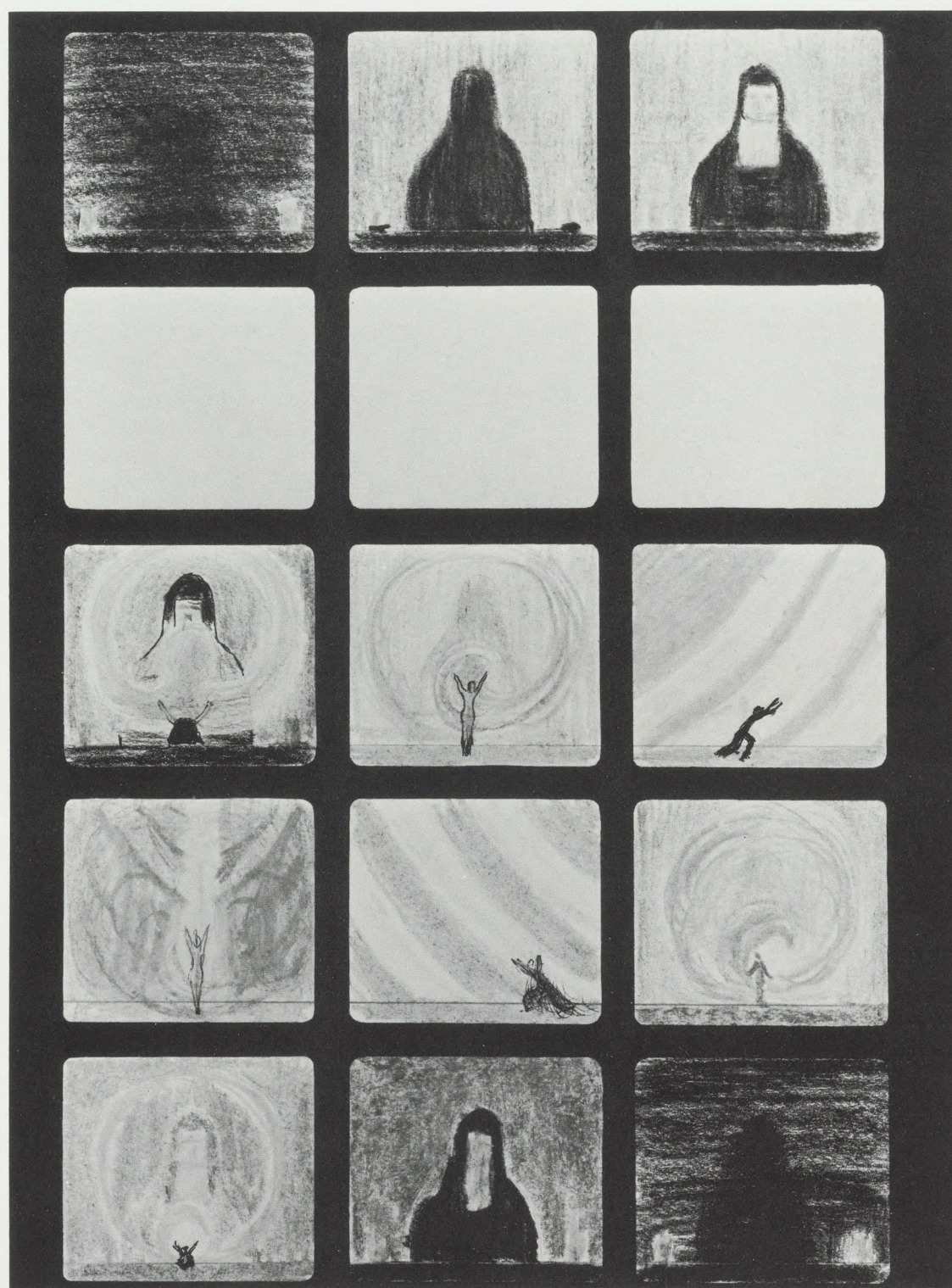
Thomas Wilfred worked in virtual isolation for more than sixty years and struggled to uncover the secrets of an art of light. He executed each detail of his art with meticulous care, demanding the highest standards of craftsmanship, which his instruments exhibit. His relatively small but impressive oeuvre is the legacy of an unusual mind, one which successfully combined the artistic and the technological.





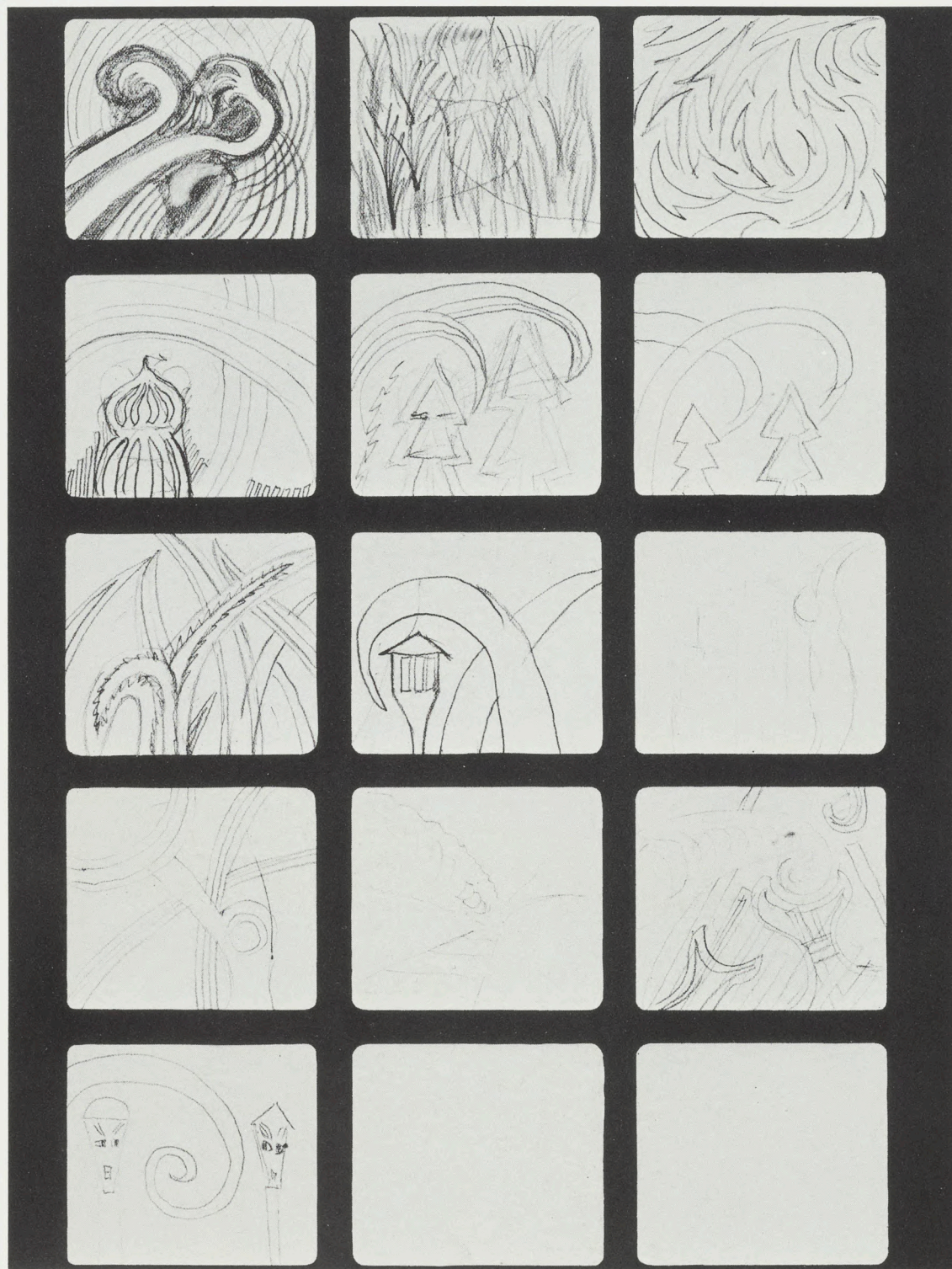
*ORIENTALE, op. 155, 1962*





STUDY OF FORM AND COLOR CYCLE FOR LIGHT SETTING, (1928)





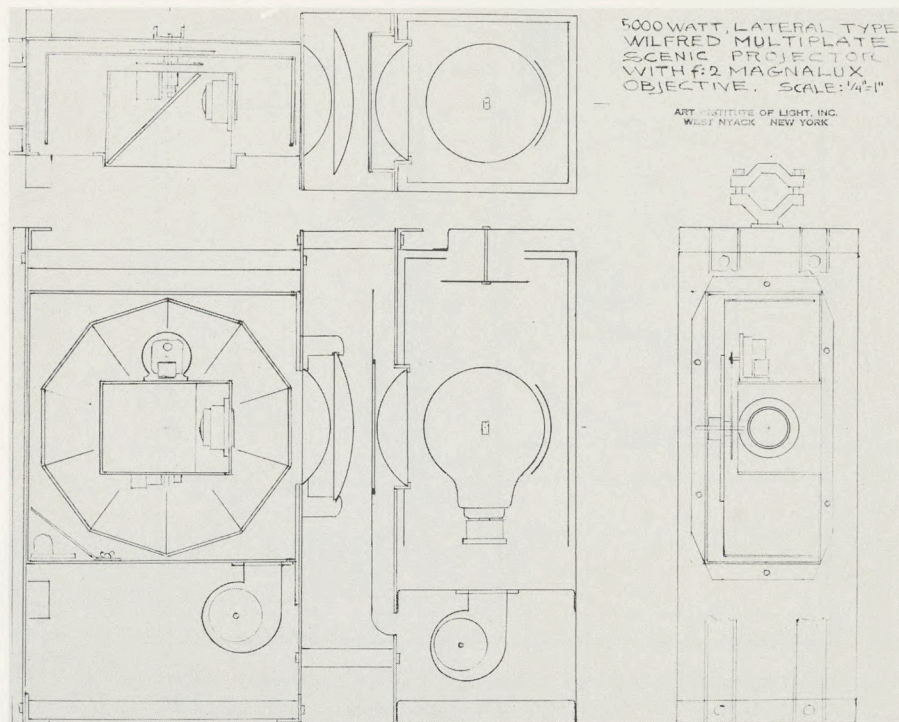
STUDY OF FORM CYCLE DEVELOPMENT, (1938)



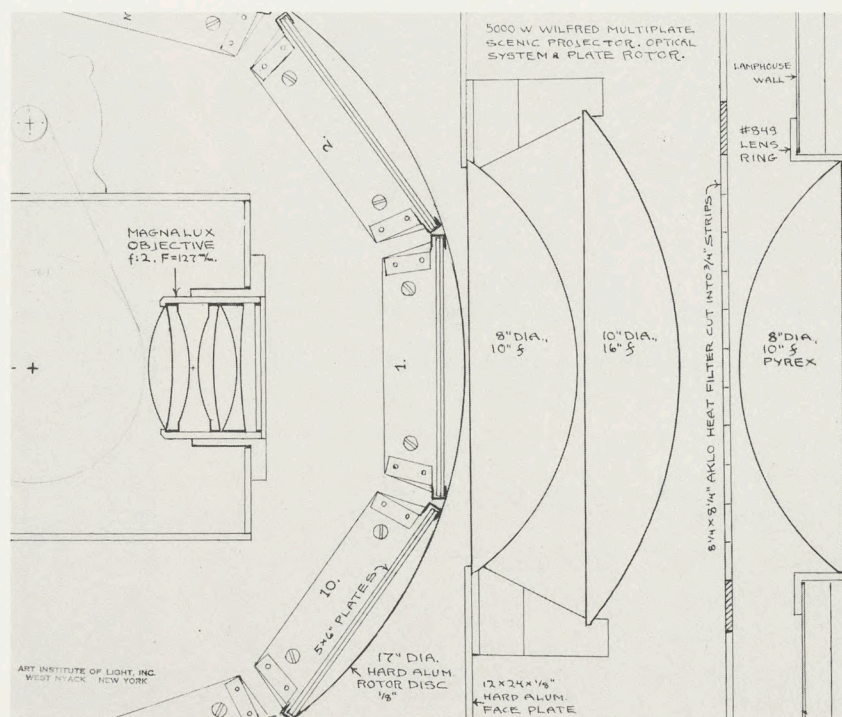


*STUDY IN DEPTH, op. 152, 1959*





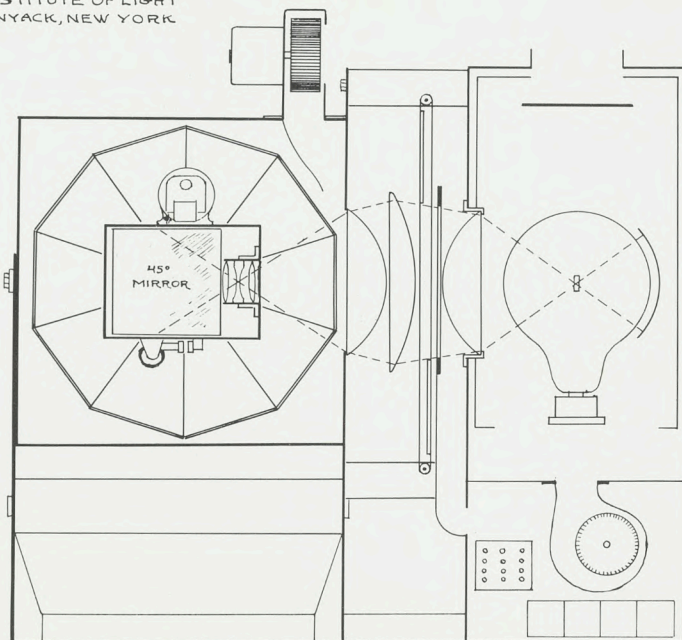
5KW LATERAL MODEL MULTIPLATE SCENIC PROJECTOR, (1950-57)



5000 WATT WILFRED MULTIPLATE SCENIC PROJECTOR. OPTICAL SYSTEM AND PLATE ROTOR, (1950-57)

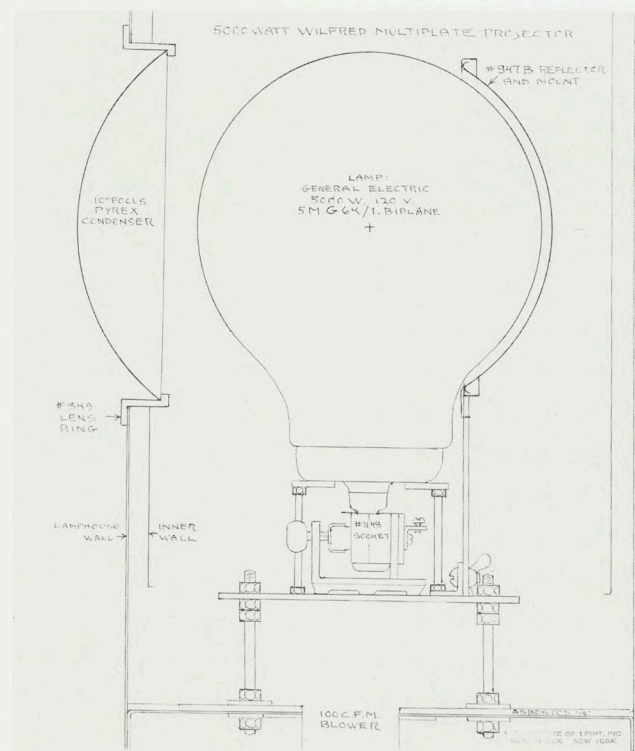


ART INSTITUTE OF LIGHT  
WEST NYACK, NEW YORK



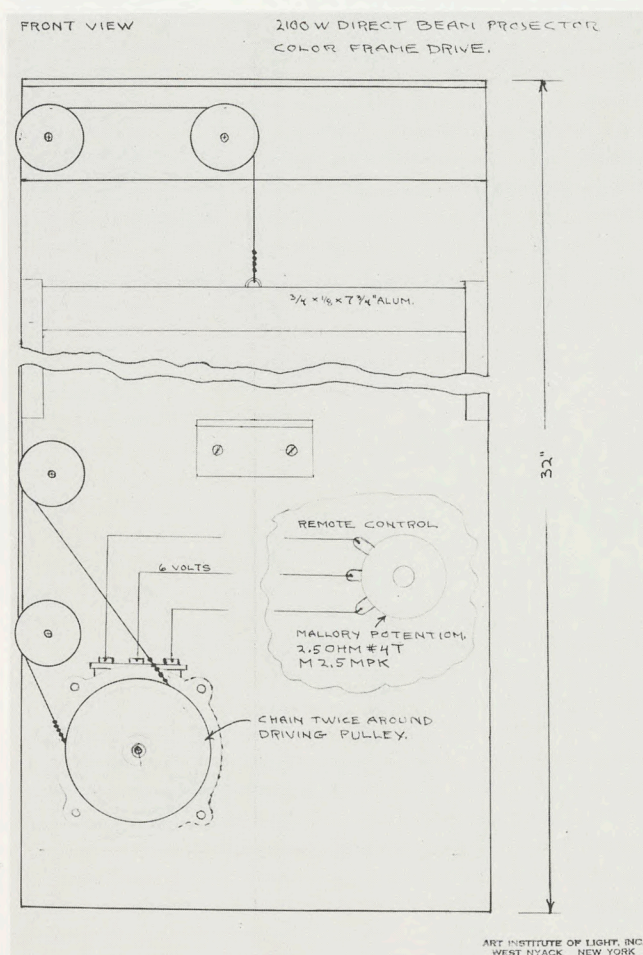
DIAGRAMMATIC FRONT VIEW OF 5 K.W. LATERAL MODEL  
MULTIPLATE SCENIC PROJECTOR. SCALE:  $\frac{1}{4}"=1"$ .

DIAGRAMMATIC FRONT VIEW OF 5KW LATERAL MODEL MULTIPLATE  
SCENIC PROJECTOR, (1950-57)

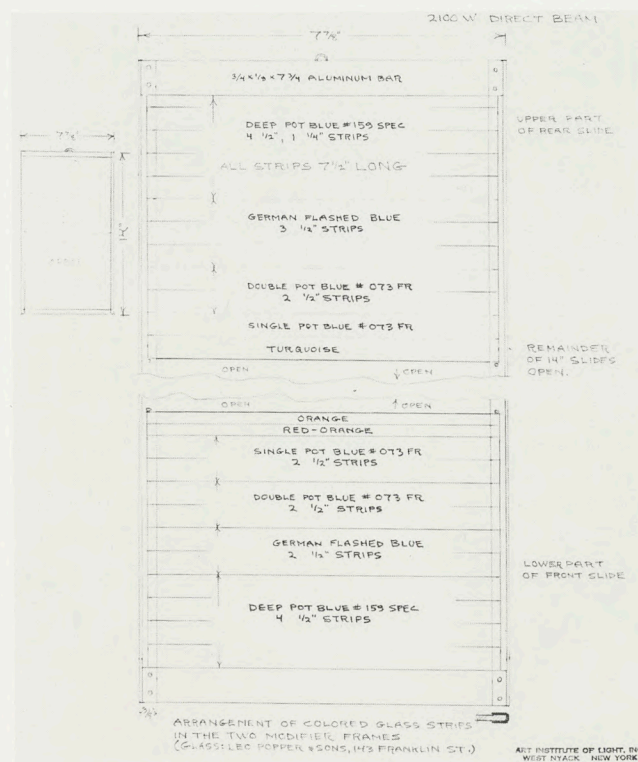


LAMPHOUSE DETAILS FOR 5000 WATT MULTIPLATE PROJECTOR, (1950-57)



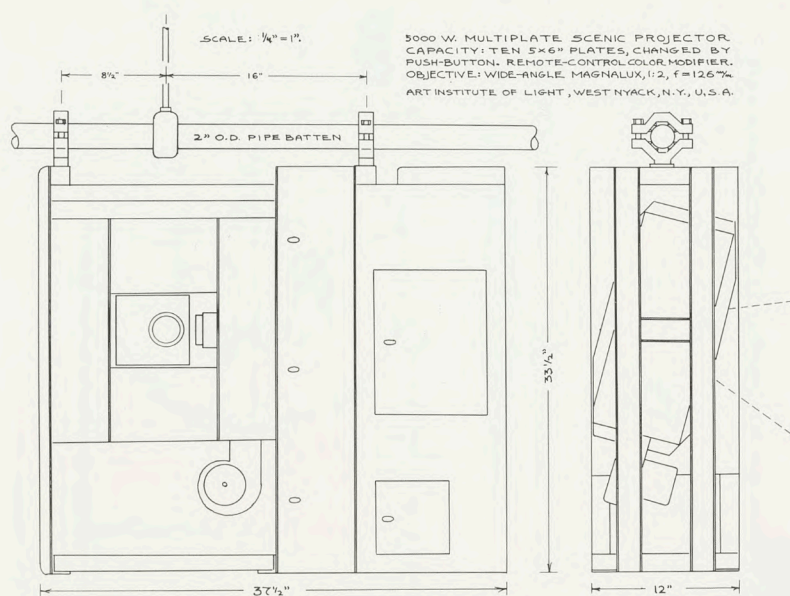


FRONT VIEW OF 2100 WATT DIRECT BEAM PROJECTOR COLOR FRAME DRIVE, (1950-57)

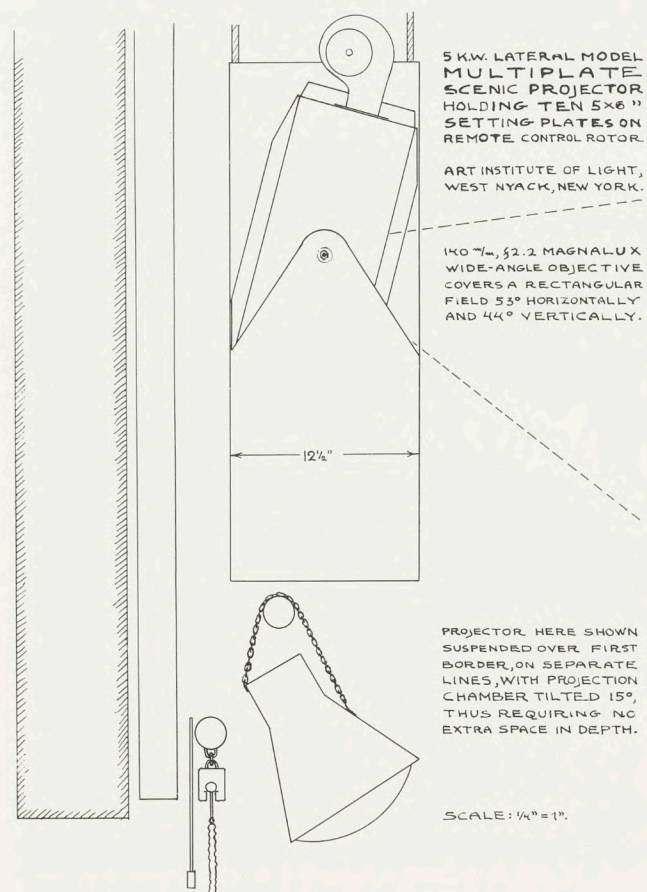


ARRANGEMENT OF COLORED GLASS STRIPS IN THE TWO MODIFIER FRAMES FOR 2100 WATT DIRECT BEAM PROJECTOR, (1950-57)



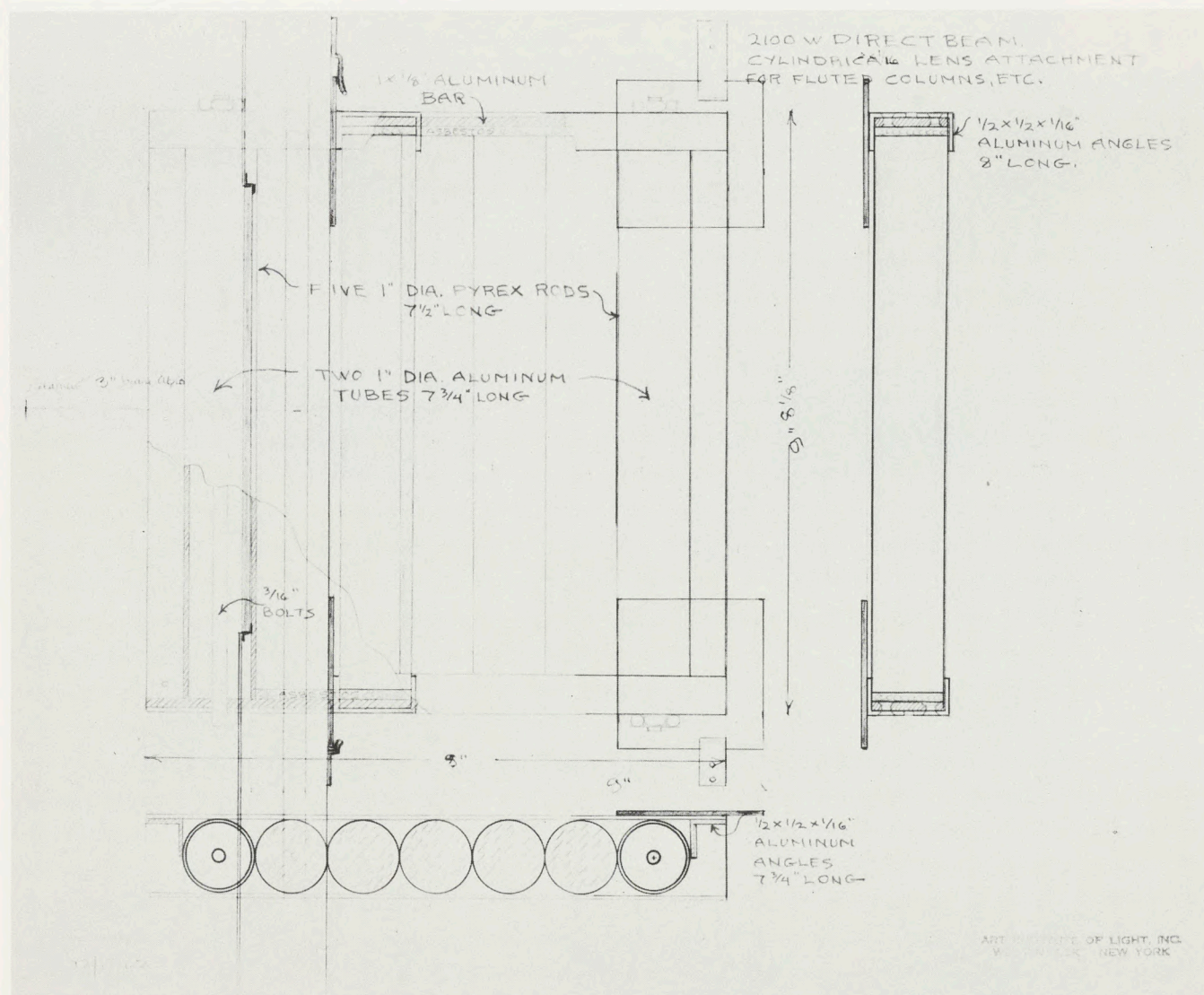


5000 WATT MULTIPLATE SCENIC PROJECTOR, (1950-57)



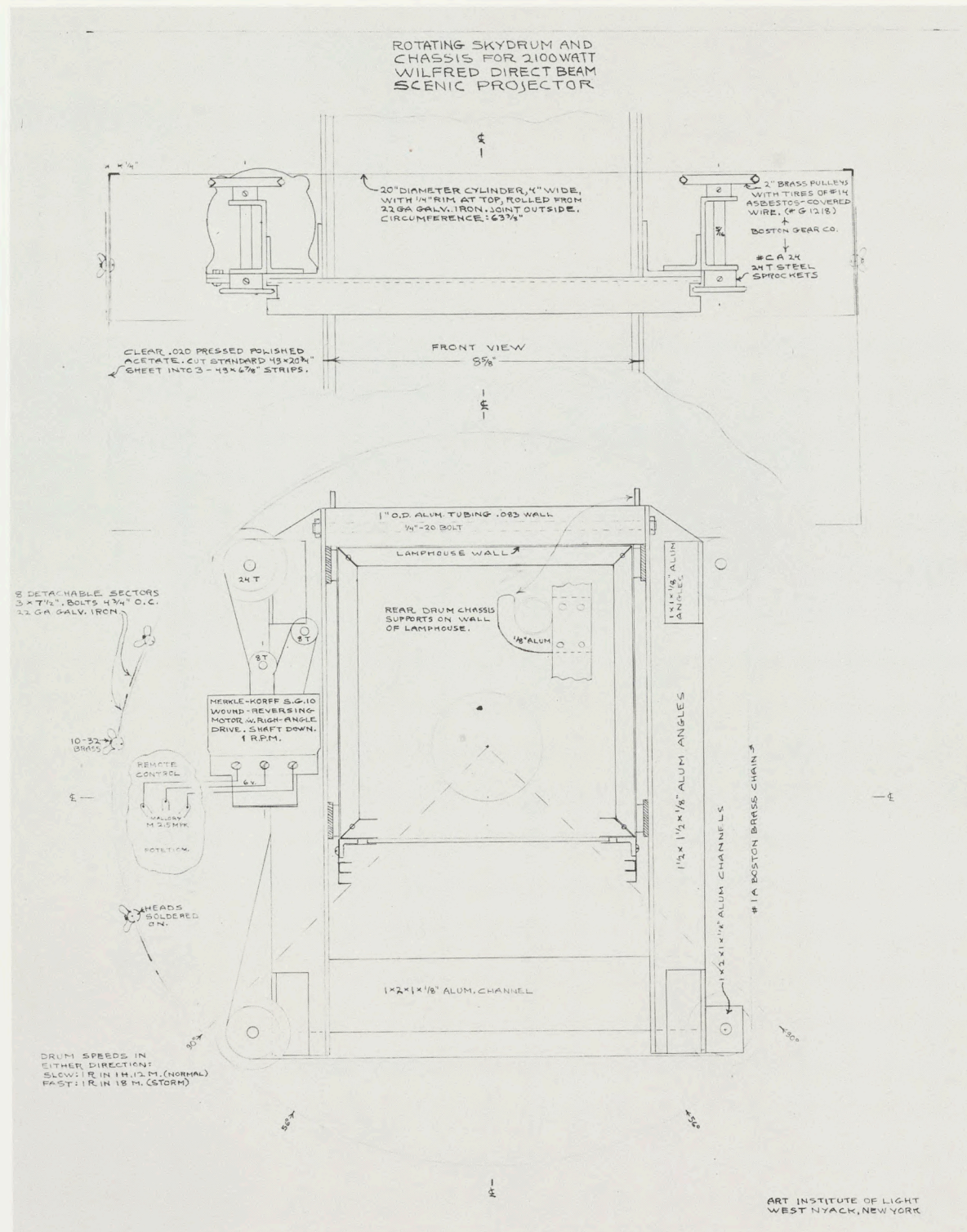
5KW LATERAL MODEL MULTIPLATE SCENIC PROJECTOR, (1950-57)





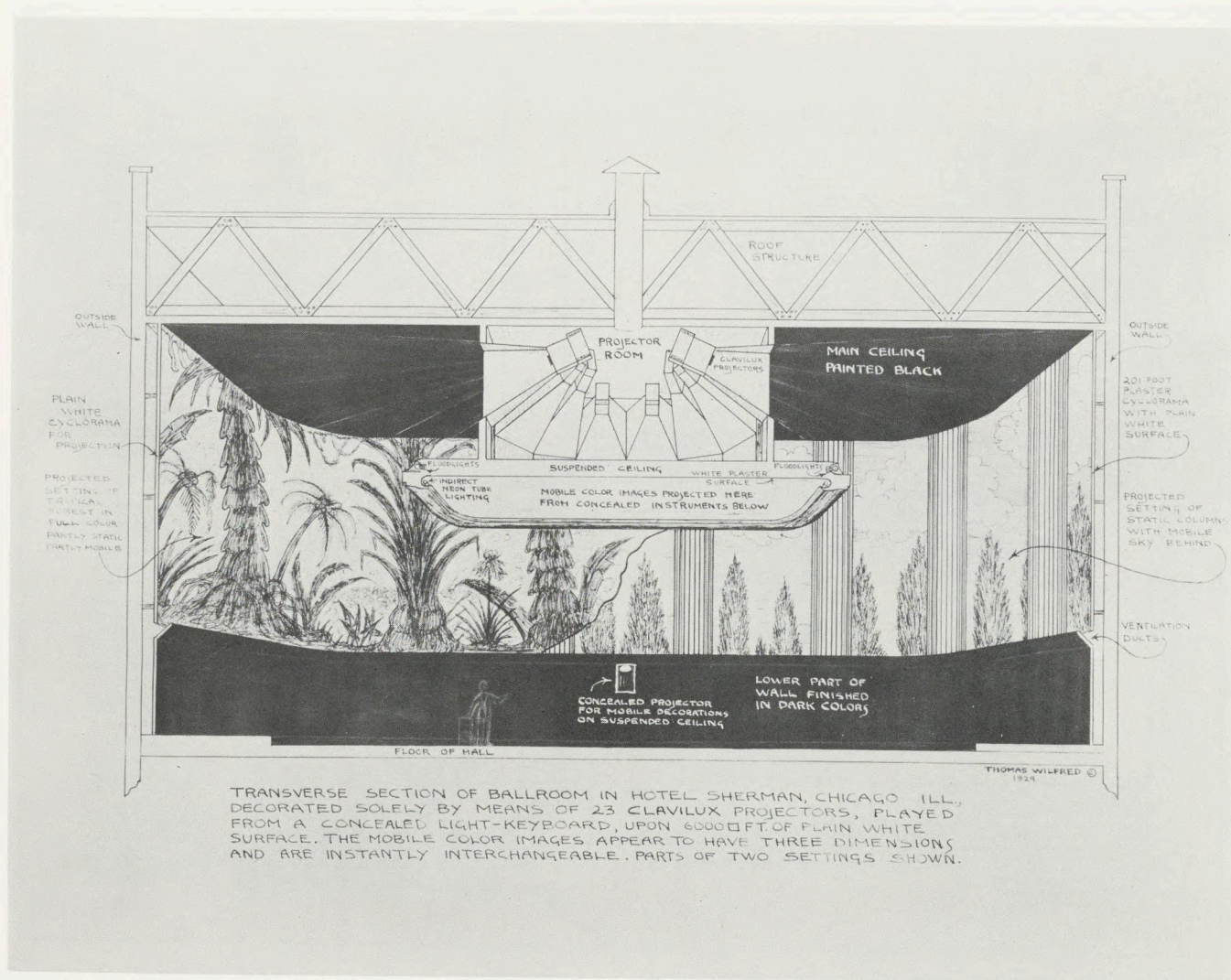
2100 WATT DIRECT BEAM CYLINDRICAL LENS ATTACHMENT FOR FLUTED COLUMNS (2), December 17, 1962





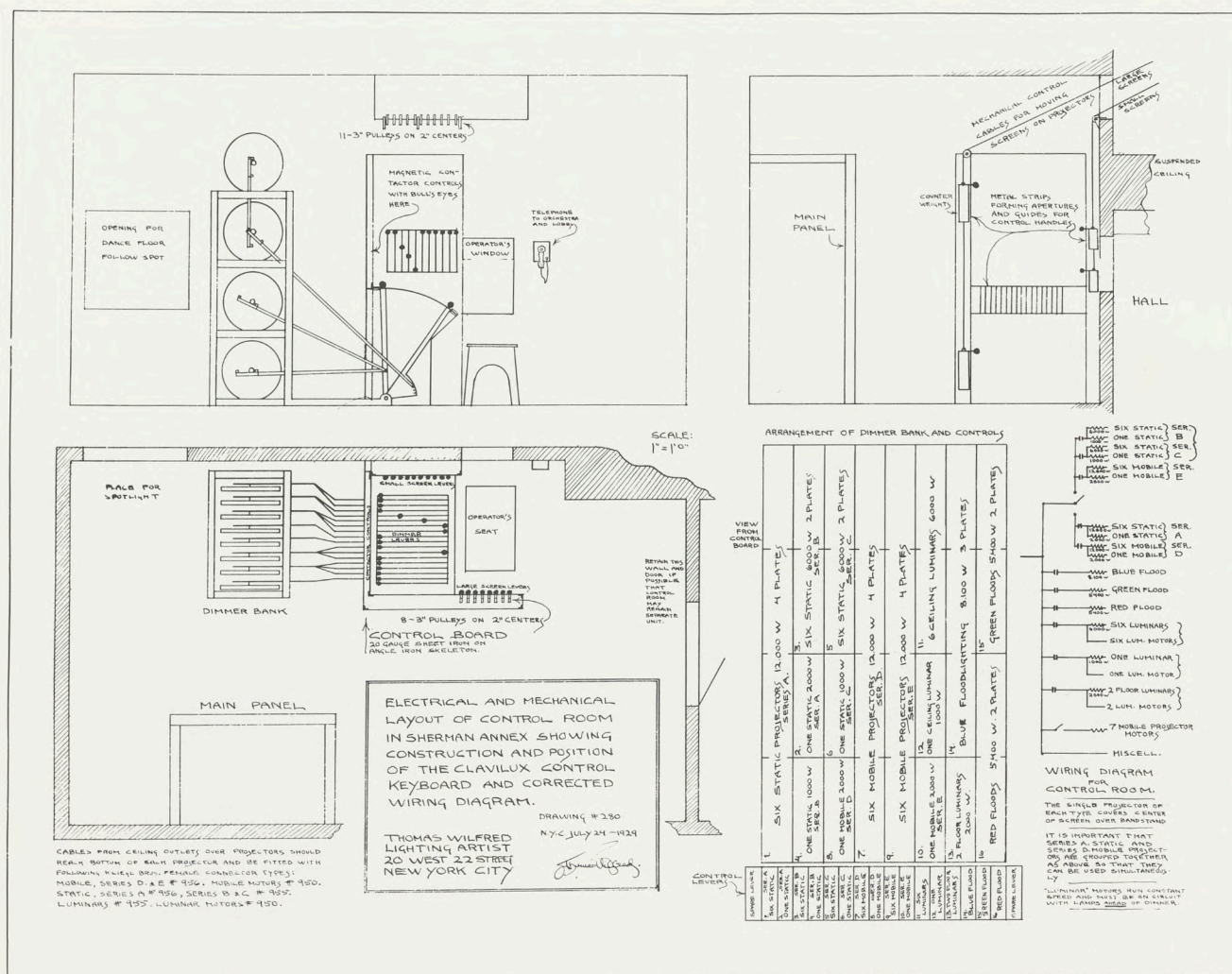
ROTATING SKYDRUM AND CHASSIS FOR 2100 WATT WILFRED DIRECT BEAM SCENIC PROJECTOR, (1950-57)





TRANSVERSE SECTION OF BALLROOM IN HOTEL SHERMAN, CHICAGO, 1929

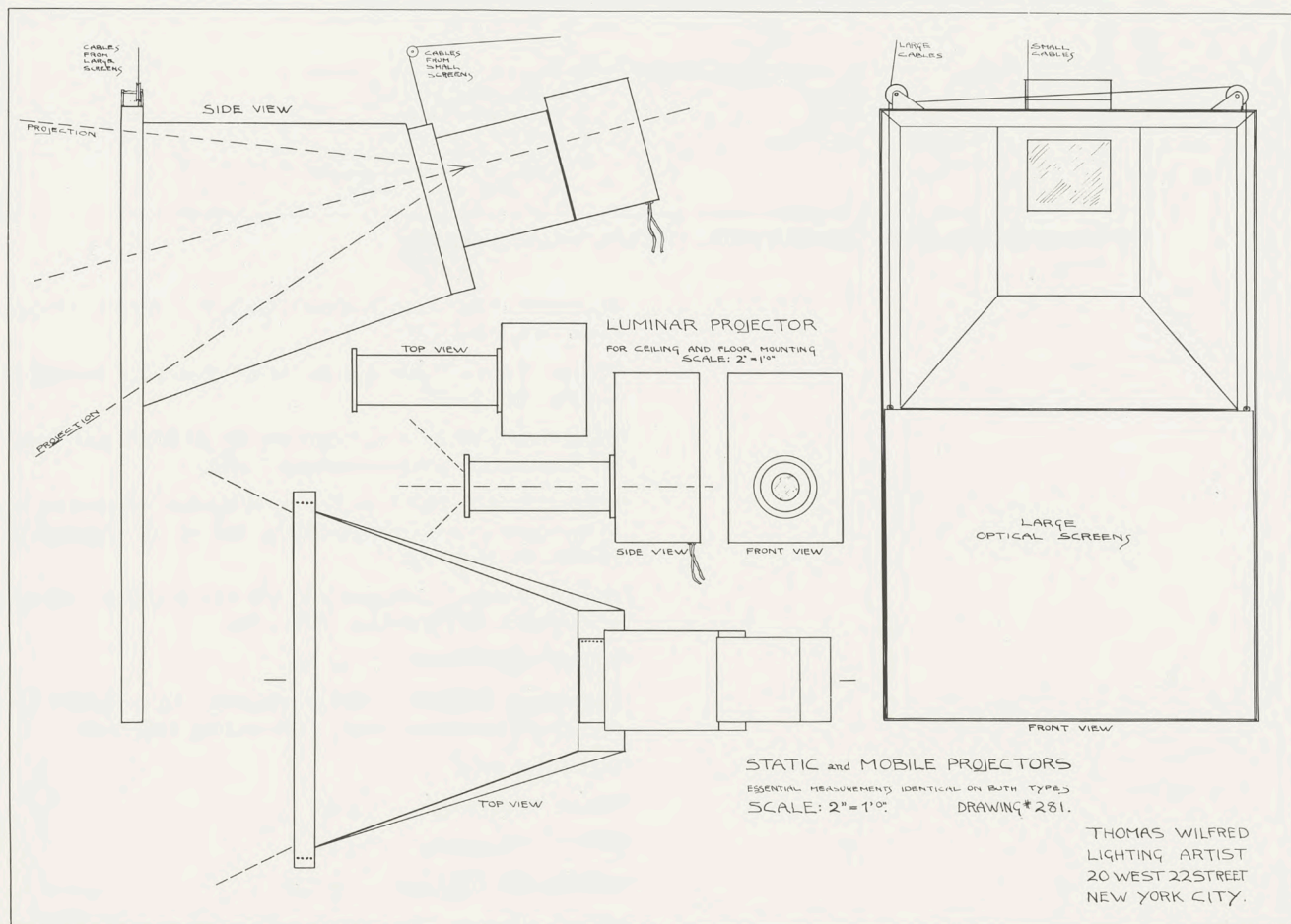




ELECTRICAL AND MECHANICAL LAYOUT OF CONTROL ROOM, SHOWING CONSTRUCTION AND POSITION OF THE CLAVILUX CONTROL

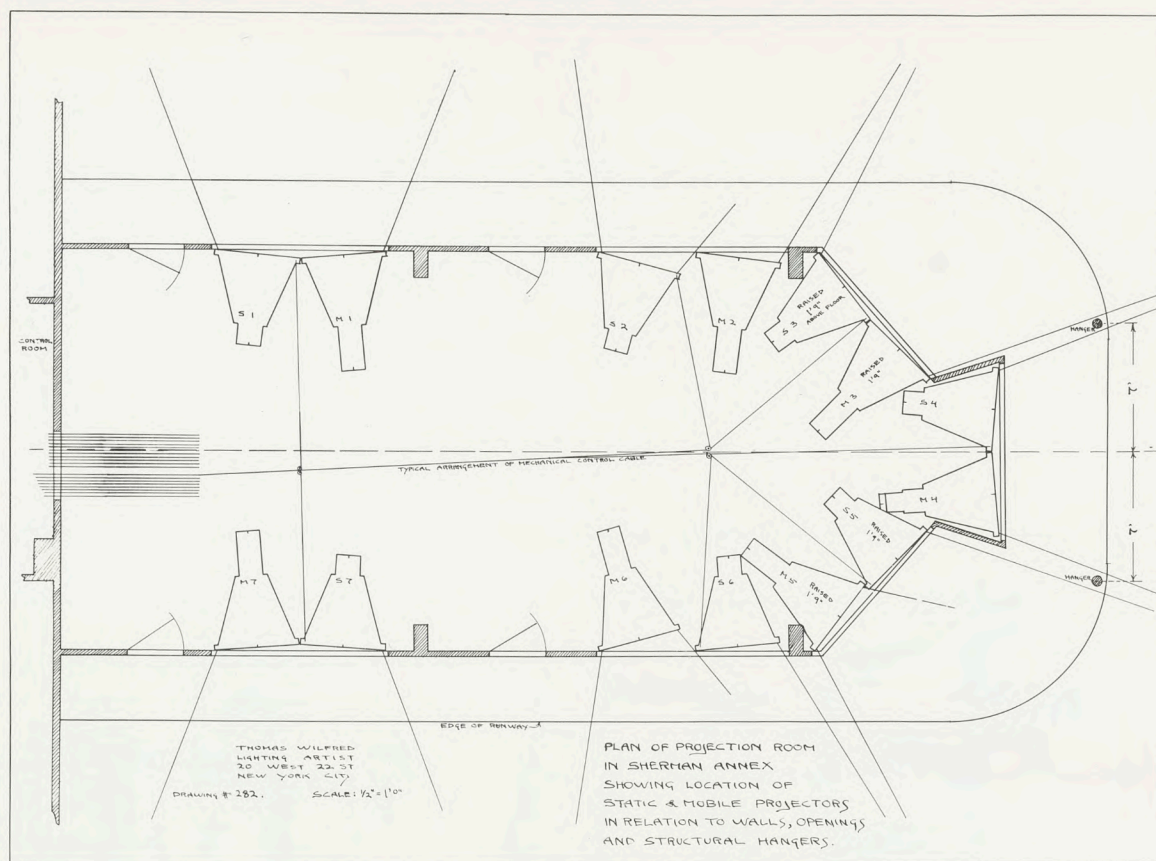
KEYBOARD AND CORRECTED WIRING DIAGRAM FOR SHERMAN ANNEX, CHICAGO, DRAWING #280, July 24, 1929





STATIC AND MOBILE PROJECTORS, SHERMAN HOTEL, CHICAGO, DRAWING #281, 1929





PLAN OF PROJECTION ROOM, SHERMAN HOTEL, CHICAGO, DRAWING #282, 1929

<sup>1</sup>Rimington, A.W., *Colour Music: The Art of Mobile Colour*, (New York, 1911), p. 3.

<sup>2</sup>Wilfred, Thomas, "Light and the Artist," *Journal of Aesthetics*, V (June, 1947), p. 252.

<sup>3</sup>Frankenstein, Alfred, "Art Conjured Out of Space and Time," *San Francisco Chronicle*, November 6, 1938.

<sup>4</sup>Letter of June 1, 1965 from Thomas Wilfred to Alfred Barr, Jr. to be found in the correspondence files at The Museum of Modern Art, New York.

<sup>5</sup>Wilfred, Thomas, "Composing in the Art of Lumia," *Journal of Aesthetics*, VII (December, 1948) p. 80.

<sup>6</sup>Wilfred, "Light and the . . .," p. 254.

<sup>7</sup>Seidenberg, Roderick, "Mobile Painting—Art's Newest Expression," *International Studio*, LXXV (March, 1922) p. 84.

<sup>8</sup>Seidenberg, p. 85.

<sup>9</sup>Wilfred, "Composing . . .," p. 86.

<sup>10</sup>Wilfred, "Composing . . .," p. 81.

<sup>11</sup>Wilfred, "The Projected . . .," p. 138.

<sup>12</sup>Wilfred, Thomas, "Prometheus and Melpomene," *Theatre Arts Magazine*, (September, 1928), p. 640.



## EXCERPTS FROM THE ARTIST'S WRITINGS



## A PERSONAL STATEMENT by Thomas Wilfred, December, 1930

Through twenty two years of research work I have helped to lay a foundation for an independent Art-form of Light—first by establishing its three basic factors as Form, Motion, and Color—second by inventing and building a number of Instruments with which I have succeeded in providing beyond refute my much contested statement that an artist can create and give a completely satisfying message of beauty solely through the medium of Light projected on a white screen from an instrument that gives him control over Form, Motion and Color.

Such an Instrument is the key to all further progress in this field.

While I hold patents on three basic principles that cover a wide angle of the possibilities, I have, so far, only been able to build very primitive and limited instruments (the necessary portable units for lectures and recitals) and furthermore, in order to make a living and yet progress a little, I have had to make exclusive use of the results of my work.

This has naturally been resented by a number of artists who have wanted to compose in the new medium but whom I've been financially unable to supply with instruments.

These workers should, of course, have instruments and facilities for experimentation and performance—otherwise a great and helpful public interest that has been aroused both here and in Europe will not be kept alive—the considerable data I have gathered through many years will be of no benefit to future workers—and most important of all: IF I CONTINUE TO PLAY PUBLIC RECITALS ON INADEQUATE INSTRUMENTS THE BEGINNING OF A GREAT AND SIGNIFICANT NEW ART FORM WILL BE CLASSIFIED BY MANY AS MERELY A NEW PROJECTION APPARATUS EXPLOITED BY A SELFISH INVENTOR.

I THEREFORE PROPOSE THE FOUNDATION OF AN ENDOWED ART INSTITUTE OF LIGHT.

As an initial contribution I am giving:

The use of all my patents.

The complete results of my research work.

My collection of Books, Manuscripts, Tools and Instruments.

The rest of my life spent in research, composing and teaching.

Many artists have come to me with inspired ideas for glorious visual compositions, but though my little studio is piled high with plans for Instruments that could make these dreams reality, I am unable to help.

Most of my own visions remain on paper as none of my present instruments will respond to them.

Millions are given annually by foundations and individuals for research into the Past. But ours is a pioneer country built by those who dared to venture beyond the horizon, and I feel confident that enough interest and support can be found to make possible this research into the Future that we may learn to draw beauty from the greatest force in the Universe.

I call on all with vision and means to help me with this project.



## Excerpts from an unpublished manuscript *Lumia, The Art of Light* by Thomas Wilfred, 1945-1947

### ART

Few words have been more widely applied, more variously defined. Originally, the word art denoted "that which man can do," while the word science stood for "that which man knows." But art came to include also the sciences; it became necessary to employ the distinctive term: fine art, and today the word art has come to mean painting only, at least in everyday usage. "He is an artist" invites the question "Portrait, landscape, or-?" and an art dealer is one who sells paintings. (page 16)

Art and science are two different and separate manifestations of human endeavor.

*Art is the individual and free expression of Emotion.*

*Science is the collective discovery, definition, classification and co-ordination of verifiable Facts.*

There can be no scientific art, no artistic science.

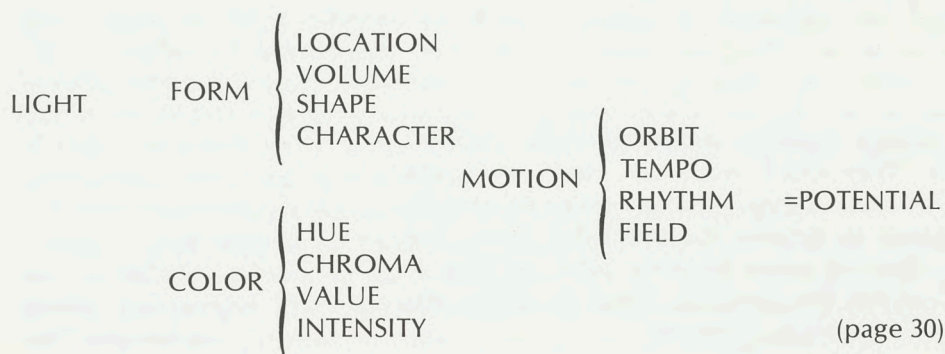
But, while the two may never truly merge, and while art can do very little for science, science can do much for art. Science furnishes the tools and materials for all the arts, it supplies lumia with lamps, lenses, color filters, and a thousand mechanical and electrical items—yet all this has in no sense made lumia a scientific art. (page 16)

As a boy, I passed a great equestrian statue every day on my way to school. Many years, and many pigeons, had coated it with a pale turquoise patina and I rarely noticed it. But one evening my father took me to see a torchlight procession and we came to stand right under the statue, in a densely packed crowd—all I could see at first was the vague silhouette of rider and horse against the night sky. Then came the slow crescendo of band music and torchlight; I looked up and beheld a fierce warrior with growing anger flushing his face as the flickering light increased; the horse's nostrils seemed to vibrate, the animal about to rear and charge through the crowd; the fantastic living light had imbued the statue with life and meaning. (page 138)

Light is the silent universal expression of the greatest force our senses can grasp. Is it not therefore logical to conceive of the noblest esthetic use of light in just this direction, and first of all express the human longing which light has always symbolized—a longing for a greater reality, a cosmic consciousness, that we may balance the human entity against the great common denominator—the universal rhythmic flow. (page 66)



All factors derive from light, to unite again in potential, all visual possibilities of space and time arranged in logical sequence and proper places.



Lumia is neither composed nor performed like music. (page 202)

Music is built upon a basic foundation of silence . . . Lumia, likewise rests on a basic foundation—Darkness. Darkness must be established initial to any manifestation in the art of light, and only that light which the artist releases from his instrument must be permitted to fall on the screen. The end of a composition should be a moment of absolute darkness. (page 20)

Lumia . . . , like music, . . . needs an interpreting artist who also gives something new every time he plays a visual composition. Lumia is, like music, a living art; a composition may be reproduced by mechanical means, but the interpreter cannot be eliminated. (page 62)

In lumia the performance of nearly every new work means readjustments, changes, or new additions to the existing equipment. Lumia may never be played in the manner of music—instantly, on an instrument embodying a fixed number of rigidly standardized projectors. (page 202)

The idea for a composition may take shape while the composer is improvising at the keyboard, but the present instrument is still too inflexible for much of this. Most of my own compositions have come to me while I was far from any instrument, have often been sketched on restaurant menus, and the like; in one case on a paper plate left by a thoughtful picnicker. (page 73)

In most lumia compositions, the artist employs several forms, or groups of forms, but one form, or group, generally predominates as a theme, or solo evolution, while the remainder are secondary, or accompaniment.

In many cases, the single form may be of such volume that only a part of it is visible at a time. The rest of it—its extension in second field—then becomes conjecture. (page 40)



Most of the color musicians, including [Alexander] Rimington, attempted to separate color from form and realized too late in their careers that they had violated a basic principle in vision—that the human eye cannot function properly without the visual anchorage provided by form, be it ever so simple. (page 154)

Color is the fractional manifestation of light, non-existent without light. A color is an optical phenomenon, not a pigment. Without light, a prism is just a block of clear glass, a pigment only a chemical preparation. Each is capable of breaking up the white light into its component colors—the prism by separating the different wavelengths from one another, the pigment by absorbing some of them and allowing the rest to reach your eye—yet neither prism nor pigment has more color than an untouched piano has sound. (page 42)

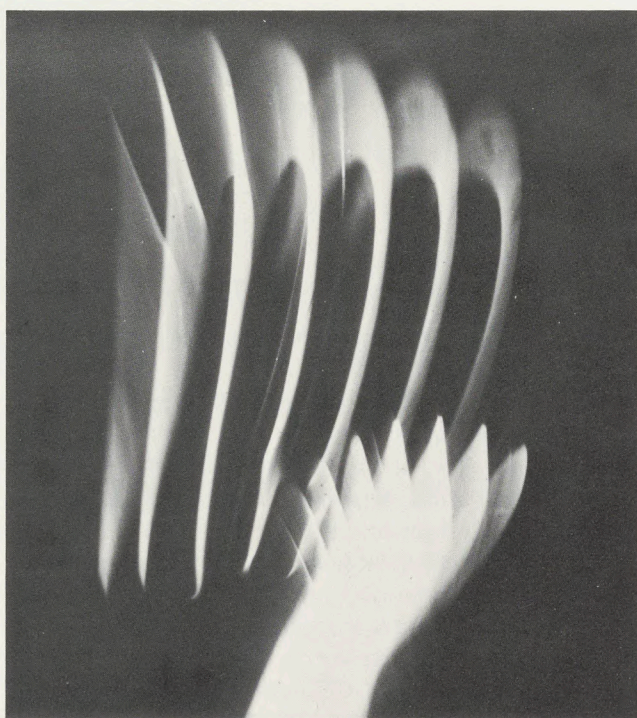
In lumia color acts only momentarily on the spectator and is, except for brief moments, always linked up with form and motion; the psychological effect is here a composite of the three factors. (page 56)

If, through the ages, all suns and planets had traced their orbits in permanent luminous curves, we should now be surrounded by a gigantic mobile rhythmic pattern, or tracery, of indescribable beauty and magnitude, growing more complex with every recurrent cycle. This, to me, is a rhythmic ideal for lumia in its purest and most significant form, one I have attempted to express in many of my compositions—an esthetic concept we cannot express nearly as directly or eloquently through any other art. (page 66)

#### RHYTHMIC MANIFESTATIONS WITHIN THE OTHER FACTORS

- in Location—A form recurrently appearing and disappearing in the same location.
- in Volume—Expanding and contracting form.
- in Shape—Alternation between spherical and elliptical shape.
- in Character—Alternation between opacity and transparency.
- in Hue—Alternation between blue and violet.
- in Chroma—Alternation between pure green and gray green.
- in Value—Alternation between dark red and pale red.
- in Intensity—Alternation between a brilliant and a faint orange.
- in Orbit—Form moving through spiral orbit.
- in Tempo—Periodic changes in velocity.
- in Field—Form moving through circular orbit, half of which lies in second field. During its motion the form therefore periodically disappears from view to reappear as the orbit re-enters first field. (page 68)







PASSAGE OF EIGHT SECONDS FROM UNFOLDING, Op. 127.

This composition is an expression of happiness and exuberance. From an unseen nucleus in lower second field a multitude of slender curved tendrils rise through first field to disappear into upper second field. Each cluster of tendrils detaches itself from a slower moving core which, in turn, expands and rises. The color sequence is kept in the cool range with three sudden sweeps of orange-red, red-magenta, and magenta, all at full chroma and intensity. The tempo is a constant accelerando to a presto in the concluding climax of white forms on an ultramarine-blue background. (page 101)



The art of light is far too important to begin its life with imitation. Rules and regulations will come soon enough, let lumia follow the way of all healthy growth and find its own way, find itself. Plenty of time. (page 72)

Our problem is definitely to shun all imitation, to deal with lumia in terms of itself by discovering how to execute the composer's work most effectively while allowing the performing lumianist the greatest possible latitude for personal interpretation. The result alone matters. (page 202)

One of the greatest difficulties the painter has to overcome when he turns to work in lumia—that he is likely to think in terms of a succession of static images when he is to create a constant flow, an uninterrupted visual sequence, that he cannot seize a “fleeting moment” in a lumia composition because it has meaning only as a link between what has been seen and what is to follow. (page 162)

If a lumia composition is stopped at any point in the sequence, an analysis of the static passage may show both form and color out of balance from the painter's point of view. The passage will have meaning only when viewed as a link between that which came before it and that which is to follow. Balance in form and color is kinetic, may involve the entire movement from beginning to end. The composition may be symmetrical in a kinetic sense without a single moment of static symmetry, no matter where the motion is stopped. (page 72)

Lumia has been termed “painting with light,” but the term is misleading; . . . there is, however, a branch of lumia which may be termed: painting with light—it is static composition with light, lumia without motion. Here the painter is merely working with a different physical medium which permits him to add intensity to hue, chroma, and value of the colors he employs. Instead of applying pigment to a canvas, he molds and colors projected light, falling on a white screen, by means of lenses, mirrors, masks, and color filters of glass. The result is a static luminous composition independent of external illumination, therefore always the same. In addition it sheds a soft light over the room in which it is placed. (page 133)

The keyboard notation is the final transcription of composer's and technician's notes combined. It is written on vertical staffs, like the columns in a ledger, and is read down the page from above. As there is no room for a notation book on the keyboard, the notation is recorded on a long band of paper which moves upward from one roller to another, like the record in a player-piano, disclosing only the passage being played. This arrangement—called the Chronograph, and combining the functions of notation book, page turner, and metronome—is located directly under the vision



hood where the player may look from notation to screen and back again without moving his head. A tempo key controls the upward speed of the paper band, and a stationary horizontal wire in front of the moving notation means "now." (page 231)

Lumia enters the theatre as a unifying factor. The visual frame around a play has hitherto consisted partly of the painting and lighting of static scenery, partly of the more or less independent lighting of the action area. The scenic artist of today, with equipment not only for projecting his settings on neutral white surfaces but also for changing and modifying the settings in conformity with the changing action lighting, may now blend these factors together into a visual accompaniment which folds itself around speech and action as closely, and with as much flexibility, as music around an opera libretto. (page 123)

The motion picture industry has lately come forth with several innovations in size and proportion of projection screens, notably the Cinerama and the Cinemascope systems. Both of these employ "panoramic" screens, more than twice as wide as they are high, and both yield impressive illusions of depth. Such screen proportions, however, would not serve in Lumia because so many of the Lumia compositions depend on the vertical dimension for effectiveness. More significant is the "3D", the stereoscopic projection method, which presents a separate image for each eye through the use of polarized spectacles, because this method will be used in Lumia as soon as at least some of the present drawbacks have been eliminated. (page 24)

As a rule the out-of-town recitals were sponsored by local art organizations and museums, but often it was a civic club, a women's club, or a professional group. Occasionally the advance publicity we sent out would be "improved" by local publicity experts. After a recital in a Middle Western town, I was asked why I had not spoken of my efforts to get in touch with the inhabitants of Mars by means of color signals from the clavilux. Somewhat taken aback, I answered that I had never harbored such a thought. "Well—it was in The Daily Blast yesterday." (page 110A)

You do not become a pioneer by choice—it would be sheer folly to plan for such a career—but because an irresistible urge drives you on and on through all reactionary barriers, through jealousy, malice, hatred, ridicule, doubt, and loneliness. Perhaps the hardest to bear is loneliness; you will consider yourself fortunate if others follow your lead but you will forge ahead whether anyone does or not; your only true reward will come to you in your loneliness—the feeling that you have kept faith with your ideals. (page 181)



The artist realizes better than anyone how far his finished composition falls short of his initial vision. He also knows that, should he wait for a theoretically perfect instrument, that moment would never come. (page 33)

The reality will never compare with the visions you saw before you while you composed, but you will remember that lumia and its instruments are in their infancy, that even the most accomplished worker in the field is but a beginner like yourself, and that the Bach of lumia—when he arrives—may put us all to shame. A beginning must be made somewhere. (page 97)

We who have worked with lumia firmly believe it will some day symbolize the emergence of a humanity with a right to the name, quite possibly the chastened survivors of the last atomic rampage. To lay the smallest stone in the foundation, to bring the tiniest flame from the eternal fire to light the way, is a truly noble calling.

Few pioneers live to harvest what they have sown; they must be content to be links in a chain, not the chain itself. The day will come when, still far from the goal you have set for yourself, you must step aside to let a younger and stronger group continue the quest, perhaps in new directions beyond the horizon of your own vision. From then on you must watch from the sidelines with encouragement and gratitude. (page 184)



## MUSING ON THE SPHERES—a statement

by Thomas Wilfred, 1956

In the space dimension our concept of the universe is contained between the smallest particle our electron microscope can detect, and the farthest galaxy our radio telescope can locate. In the time dimension it is limited to the finite because we are unable to conceive of eternity, of phenomena and transitions having neither beginning nor end.

In the visible universe of galaxies, racing outward at almost inconceivable velocities, there are billions of solar systems, in each of which, and for countless billions of years, planets have been formed, have cooled enough to permit life, then disintegrated. And in the astronomically brief periods during which life, as we conceive of it, could evolve on them, we may surmise that civilizations vastly superior to ours have always existed, exist, and will always exist. All this is within the compass of our senses.

But beyond the reach of the electron microscope in one direction and the radio telescope in the other—what?

We have but comparatively recently discovered that each atom is a micro-firmament of orbiting electrons around a nucleus.

Is it not conceivable that each single proton in the nucleus of an atom encloses another universe?

Or that all we can detect of space is not, in turn, enclosed in the proton of an atom forming an infinitesimal beginning of still another universe, vast beyond human comprehension?

Or—since “infinitely small” to “infinitely large” merely marks the tiny span of our senses—is it not further conceivable that such dimensional transitions continue *ad infinitum* in both directions and along a curvature eventually bringing them together again in an Einsteinian fusion of dimensions to form an awe-inspiring ring, a perfect manifestation of Eternity?

The concept can at least not be disproved!

Where, now, is the flat earth, the center of the universe, the masterpiece of creation, with Heaven above, Hell below; with sun, moon and stars performing for its particular benefit, and Man the crowning achievement?

Less than a grain of dust.

And still—to be a conscious entity, shaped by cosmic forces into a body with a mind able to contemplate the majestic beauty and truth of it all, and potentially capable of converting the surrounding riches into happiness for others—what a glorious privilege!



## CHRONOLOGY



Photography studio of Charles Løvstrøm, Naestved

1889

June 18: Richard Edgar Løvstrøm born in Naestved, Denmark to Charles F. (1854-1937), a photographer, and Kathinka U. Thessen Løvstrøm (1850-1891). Older brother, Kai.



1890, with mother

1891

February 2: Mother dies in Naestved.

1892

Earliest childhood memory: Father entertains him with a faceted crystal egg that throws prismatic light on the walls and ceiling of the family library.

June 17: Father remarries Marie J. Larsen (1867-1941) in Holløse, Denmark.

1896

Begins schooling at Mørcks Skole, Naestved.



1896



1897

Transfers to Realskolen, Naestved.

1898

December: Family moves to Kolding, Denmark.



1898

1899

Enters Latinskole, Naestved.

September 7: Half-sister Erna born.

1901

April: Family moves to Copenhagen, Denmark.

Attends the first progressive school in Denmark, the School of the Danish Society, founded by C.N. Starcke.

1903

May: Studies drawing at the School of the Danish Society. Begins musical training at the piano.

1904

Attends Tekniske Skole, Copenhagen.

1905

May: Begins exploration of light and color with a cigar box, a small incandescent lamp, a few lenses, and some pieces of colored glass. Investigates the theories of Sir Isaac Newton, Father Louis Bertrand Castel, Bainbridge Bishop, Alexander Rimgton, all of whom identified the colors of the spectrum with the musical scale. Finds no aesthetic basis for theory and concludes that light may be translated only in terms of form, color, and motion.

1906

April 26: Half-sister Vika born.

Writes and publishes poetry.

1908

October 18: Arrives in Paris and studies painting and sculpture at the Sorbonne with Emile Dourdy and Renée le Guern and voice with Monceau.

Works as freelance correspondent for Danish newspapers. While completing a writing assignment on the history and development of European folk songs, uncovers manuscripts of early French folk music at the Bibliotheque Nationale, which inspires him to learn to sing and play the archaic twelve-string archlute.

Idea for the light instrument advances: includes several wooden boxes, a rudimentary keyboard, and a bed sheet for a screen.





1908

1910

December 6: Travels to England.

1911

March 12: Left London for Aalborg, Denmark.

1912

January 7: Returns to London.

1913

London: Studies voice with San Carolo.  
Assumes professional name, Thomas Wilfred.  
Idea for a light instrument takes form: uses projector with small keyboard.



1913, London

1914

May 14: Gives Royal Command performance for Queen Alexandra at the English Court on twelve-string archlute; sings European folk songs.  
September 22: Returns to Copenhagen.

1914-16

Serves in Royal Danish Army during World War I.

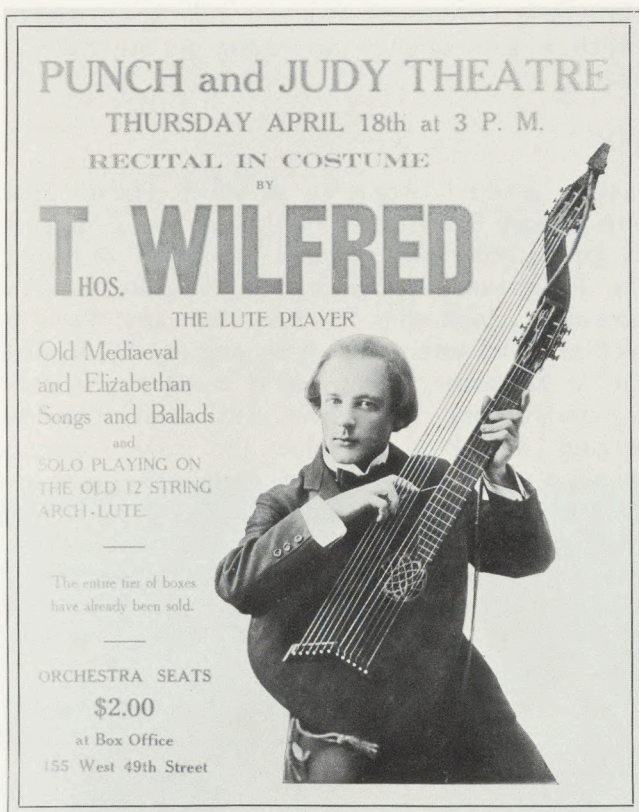
1915

Copenhagen: Gives Royal Command performance for King Christian X in castle at Amalienborg on twelve-string archlute; sings European folk songs.  
Studies voice with Vladimir Talvi, Copenhagen.

1916

October 3: Leaves family and moves to the United States; arrives in New York City aboard S.S. Hellig Olav.





1918

1919

March-May: Claude Bragdon, an architect friend, designs his first studio (Pidgeon Hill Road, South Huntington, Long Island); Wilfred builds the 20 x 40 foot studio, which contains projection space with a 15 x 24 foot curved screen, a small spectator gallery, and a workshop; clavilux keyboard located in small room below spectator gallery.

William Kirkpatrick Brice underwrites construction of first light organ, Clavilux A, and finances two years of experimentation.

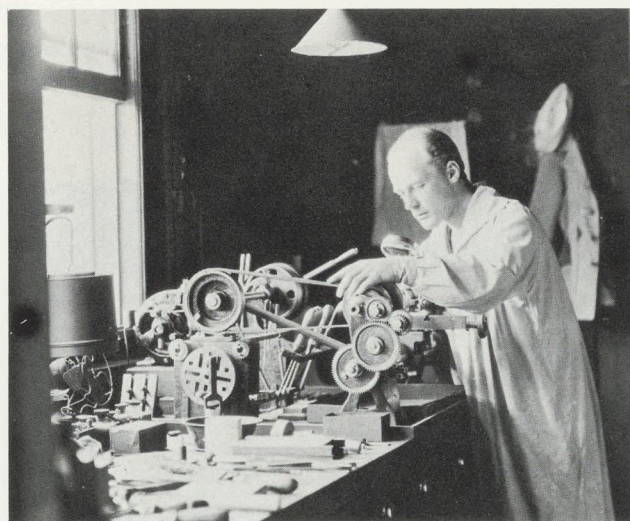
March: Meets Alfred Stieglitz and Edward Steichen as a member of New York Camera Club; learns rudiments of photography enabling him to record passages in lumia compositions. Continues membership through October, 1922.

September 21: With William Kirkpatrick Brice, Claude Bragdon, Harry Thomas Lindeberg, Van Dearing Perrine, and N. F. Trautmann forms "The

Prometheans", a cooperative, communal society for the development of the art of light "in all its possible manifestations."

1920

December: First review of Wilfred's light experiments appears in *Vanity Fair* describing a lumia performance at the Pidgeon Hill Road studio.



Studio, Huntington, Long Island

1921

Winter: Builds first portable recital clavilux, Model B.

May 14: Marries Agda Granberg, Swedish actress and pantomimist in Huntington, Long Island at the estate of William Kirkpatrick Brice.

1922

Becomes a naturalized United States citizen.

January 10: Gives first public lumia recital at the Neighborhood Playhouse, New York, sponsored by Irene and Alice Lewisohn.

March 18: Son, Thomas C. Wilfred born.

March 24-April 1: Clavilux displayed at Egyptian Hall, Wanamaker's, Philadelphia, and at the Stanley Movie Palace, Philadelphia.

Spring: Gives up singing career to concentrate efforts on the creation of an art of light.



Summer: Adds 20 x 20 foot workshop to west end of Pidgeon Hill Road studio.

1923

Constantin Stanislavsky, Ivan Moskvina, Mme. Olga Knipper-Chekhova from the Moscow Art Theatre, Arthur B. Davies and D.H. Lawrence visit Pidgeon Hill studio.

1922-25

Tours the United States and Canada giving lumia recitals. Builds clavilux Models C, D, and E.

1924

April 7: Daughter, Agnete Wilfred born.

August: Collaborates with Ruth St. Denis, Ted Shawn, The Denishawn Dancers, and a string quartet to show the conjunction of dance, music, and lumia at the Mariarden Open Air Theatre, Peterboro, Vermont; George Vail, a student of Wilfred's, performs at the clavilux console.

1925

Winter: Performs experiments with Leopold Stokowski which lead to Carnegie Hall performance in 1926.

First European tour: performs on specially designed portable clavilux.

Summer: Only representative of the United States at Exposition des Arts Decoratifs, Paris, France through efforts of Paul Poiret.

May 13: Gives inaugural clavilux recital on *Orgues*, a barge owned by Poiret, moored in the Seine near Pont Alexandre III.

Fenn Germer, Thomas Wilfred's protégé, plays daily recital on special clavilux unit (three units from Model C and focal stage unit from Model E).

May 16 and 21: Gives two recitals at Queen's Hall, London; hires an army truck installed with power-plant to run a 115v AC cable into the hall.

Accompanies Mrs. Alexander Rimington to her late husband's studio to see his color organ.

June 22: Performs recital at Royal Opera House at invitation of Danish government.

November: Abandons Pidgeon Hill Road studio, which is subsequently destroyed by fire May 7, 1941.

1926

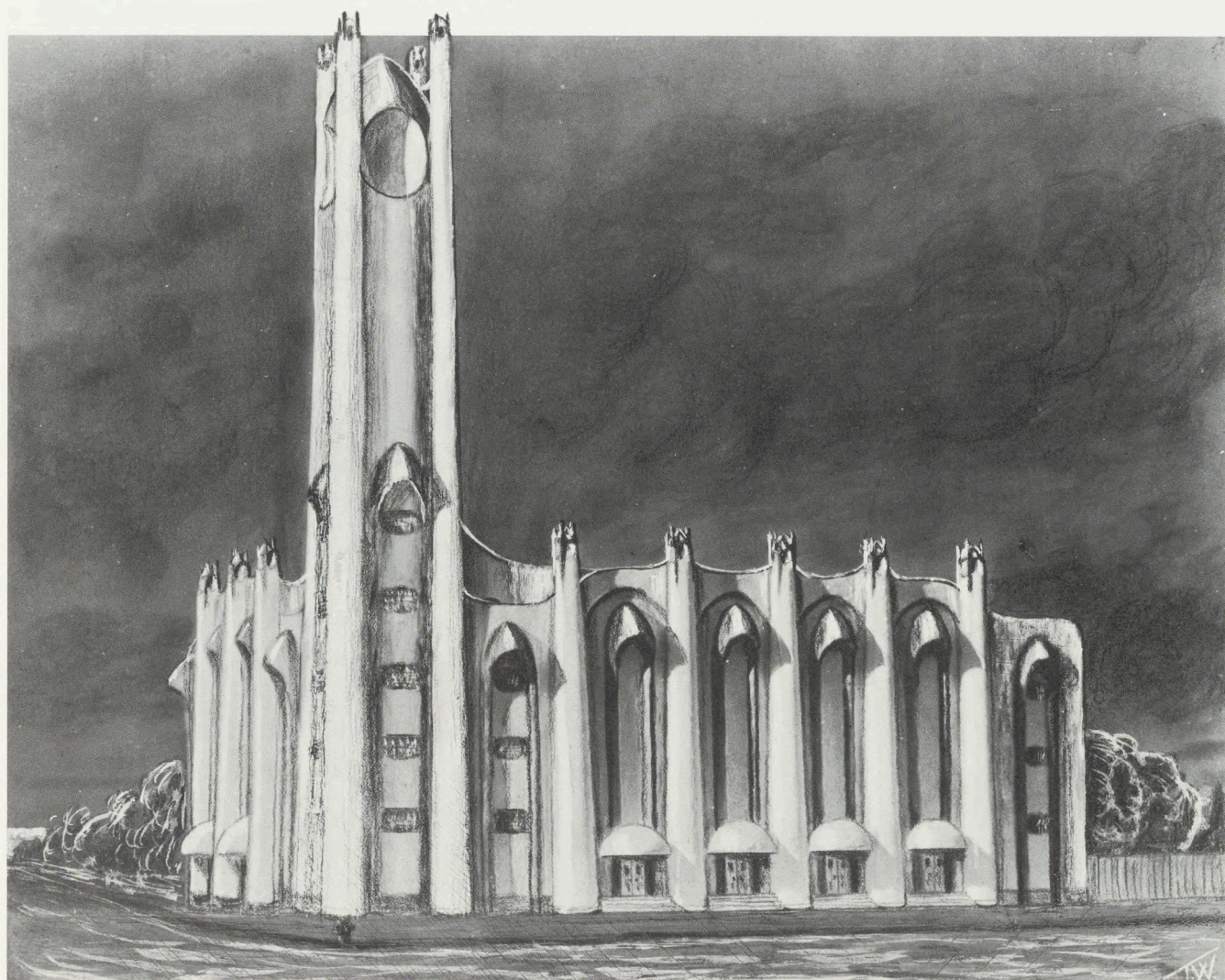
January 2 and 4, Academy of Music, Philadelphia and January 5, Carnegie Hall, New York: Appears as guest artist with Leopold Stokowski directing the Philadelphia Orchestra to illustrate lumia's potential relationship to the other arts. Plays a mobile visual setting for *Scheherazade* by Nicolai Rimsky-Korsakov. Each musical motif has a corresponding one with form and color. Clavilux located in auditorium below the stage; opaque screen (20 x 40 feet) located at stage front which conceals the orchestra and the conductor.

Plans, designs, and completes a plaster model for The Art Institute of Light building; envisions a "Temple of Light" interior, a huge white dome emerging into a circular opening (behind which is a 100 foot screen); a single tier of seats with a small lamp mounted on each. Space for clavilux instruments and symphony orchestra in front section of auditorium.

May: Moves studio to 20 West 22nd Street, New York City.

Visitors include Max Reinhardt and Serge Koussevitzky.





Photograph of plaster model for The Art Institute of Light



1927

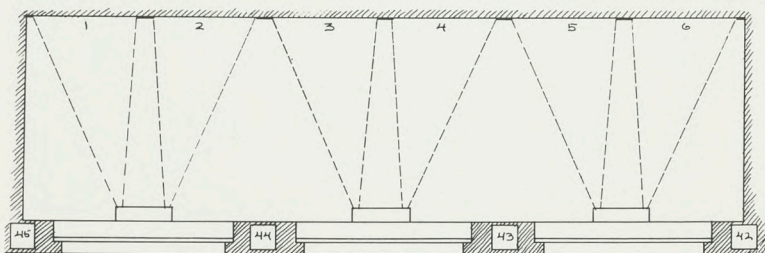
Composes and performs light setting for Henrik Ibsen's *The Vikings at Helgeland* at the Goodman Memorial Theatre, Chicago as part of Ibsen centenary celebration; directed by Thomas Wood Stevens.

1928

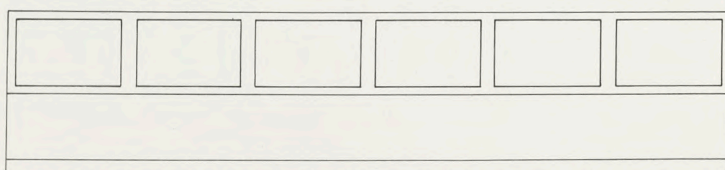
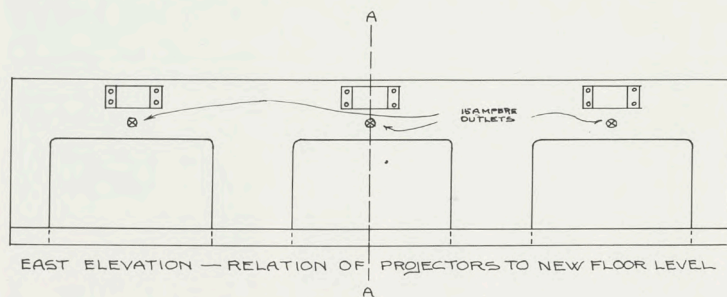
Designs light settings for platform stage production of *The Vikings at Helgeland* at Hill Auditorium, University of Michigan, Ann Arbor.

1929

October 29: Inaugurates largest work (22 x 210 feet) and first projected mobile mural for ballroom, the Bal Tabarin, at Hotel Sherman, Chicago, work commissioned by Ernest Byfield. Redesigns ballroom with curved white plaster walls. Installs 21 clavilux projectors that create static and mobile designs.



PLAN OF ROOM, SHOWING POSITION OF PROJECTORS AND SCREENS



WEST ELEVATION — SPACING OF THE SIX PROJECTION SCREENS  
NEW YORK CITY MAY 26 1931.

1930

May: Designs light sets for Richard Herndon's production of *The Vikings at Helgeland* in New York City; cast includes Blanche Yourka as Hjordis, Warren William as Sigurd, Richard Hals as Ornulf, and Charles Waldron as Gunnar.

May: Founds the Art Institute of Light, an organization and center for research in lumina. The Institute's aims are: to experiment, teach, and demonstrate the aesthetic possibilities of an art of light; to perfect and standardize equipment for artists to compose in light; to establish a library for the collection of all pertinent records, books, and other data pertaining to an art of light; to collect and preserve early instruments. Wilfred's patents and research data become the property of the Institute.

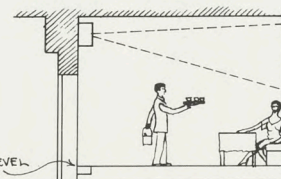
1931

Plans decoration for Aquarium Room, Hotel Sherman, Chicago, which is never executed.

SIZE OF PROJECTORS: 12' x 20' x 36"

ELECTRICAL REQUIREMENTS: 3 FLUSH 15 AMP, 115 VOLT WALL OUTLETS PLACED DIRECTLY BELOW PROJECTORS — THE THREE CIRCUITS CONTROLLED FROM A 3000 WATT CIRCULAR DIMMER PLATE

PROJECTION SCREENS: MEDIUM WEIGHT WHITE DUCK (SEAMLESS) STRETCHED TAUT ON WOODEN FRAMES AND GIVEN 2 COATS FLAT INSIDE WHITE PAINT.



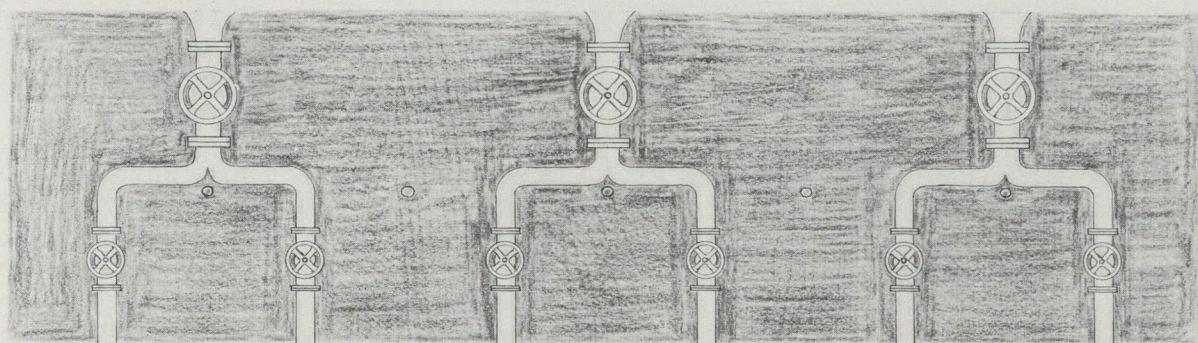
SECTION A-A, SHOWING ANGLE OF PROJECTION

ALTERATIONS TO ROOM #1, COMPRISING THE INSTALLATION OF THREE-FOUR LENS PROJECTION UNITS MOUNTED ON WALL OVER DOORS AND COVERING SIX 4'6" x 7'0" SCREENS HUNG ON OPPOSITE WALL, FRAMED IN VELVET

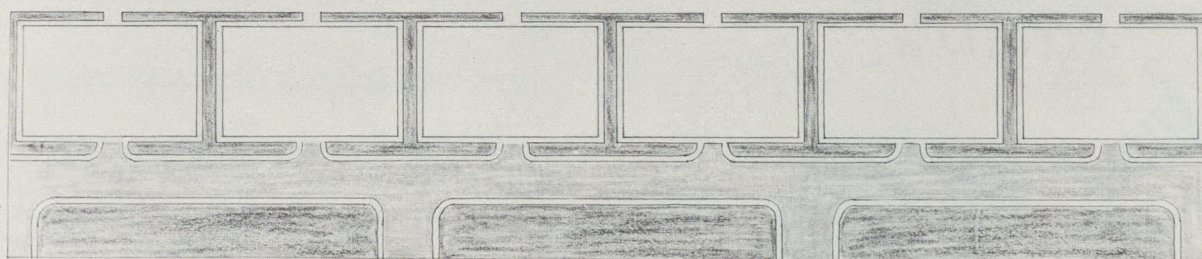
DRAWING # 3123 — SCALE = 1/4" = 1' 0"

THOMAS WILFRED, ARTIST - IN - LIGHT  
20 WEST 22 ST., NEW YORK CITY, U.S.A.

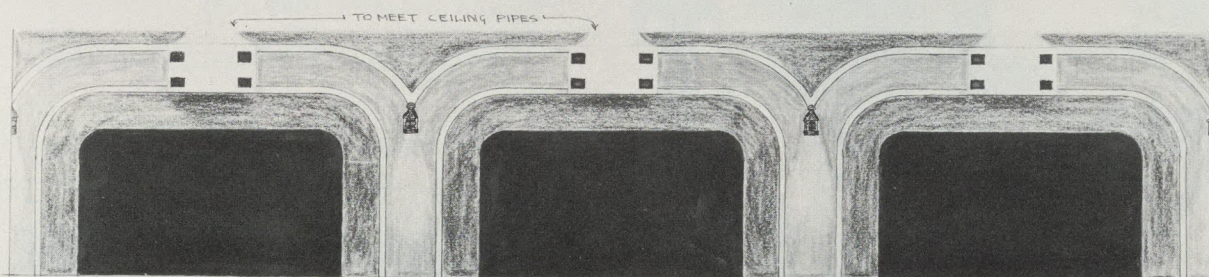




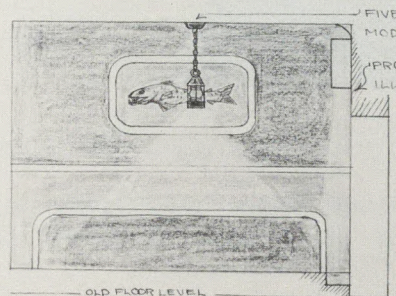
CEILING: PIPES AND VALVES PAINTED ON DARK GREEN WITH ALUMINUM PAINT. FIVE SPOTS MARK HANGING MARINE LIGHTS



SCREEN WALL: DECORATION IN TWO SHADES OF GREEN SEPARATED BY WHITE METAL BANDS—SUGGESTS FLOW OF WATER



PROJECTOR WALL: TREATMENT AS SCREEN WALL. THREE PROJECTORS FORM INTEGRAL PART OF DECORATION, JOINING CEILING.



OLD FLOOR LEVEL  
END WALLS: AWKE, TREATMENT AS ABOVE.

FIVE HANGING MARINE LANTERNS,  
MODIFIED FOR DOWNWARD THROW  
PROJECTORS HAVE AMBER LIGHT  
ILLUMINATING STEPS BELOW.

THOMAS WILFRED  
20 WEST 22<sup>ND</sup> STREET  
NEW YORK CITY

SEPTEMBER 11 1931

DRAWING # 3127

SCALE:  $\frac{3}{8}$ " = 1' 0"

PLAN FOR DECORATION OF AQUARIUM ROOM IN HOTEL  
SHERMAN, CHICAGO.

THE TWO SHADES OF GREEN ON WALLS CAN BE  
EITHER VELVETEEN OR FLAT INSIDE PAINT. CEILING  
PAINT THROUGHOUT. FLOOR CARPET TO MATCH DARKER  
SHADE OF GREEN. MOLDINGS BETWEEN SHADES  
EITHER 3" STRIPS OF DULL WHITE METAL OR 3"  
WOODEN STRIPS PAINTED (ALUMINUM PAINT)

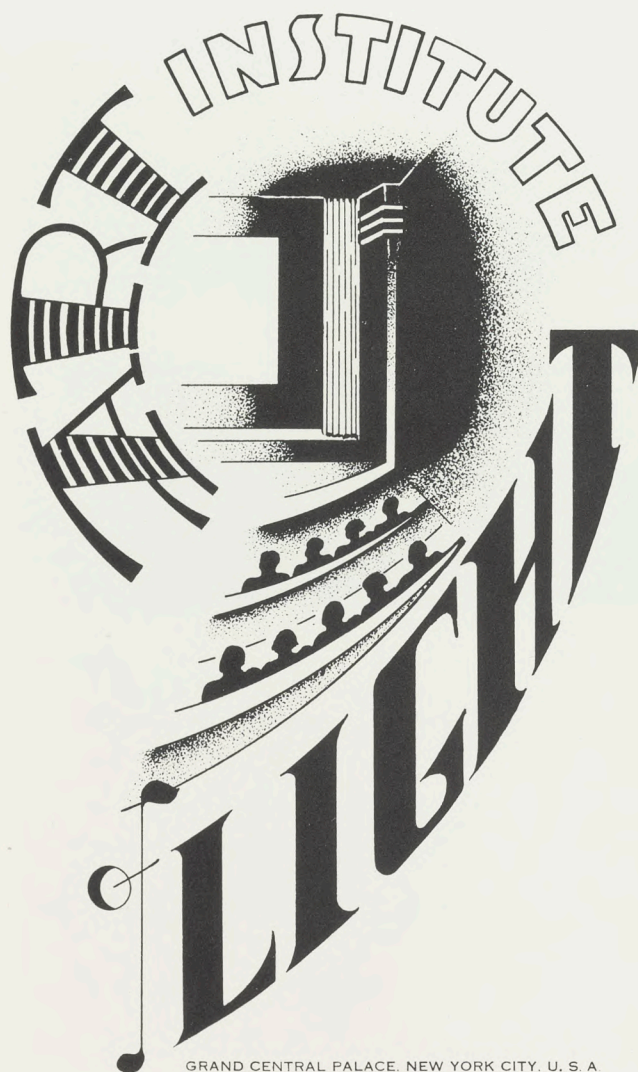
ALL OPTICAL CALCULATIONS HAVE BEEN MADE FOR  
13' 9" FROM SCREEN SURFACE TO OPPOSITE WALL



1933

March 8: Accompanies lyric soprano Julia Peters in recital of songs at Carnegie Hall, produced by George Leyden Colledge.

August 21: The Art Institute of Light is installed in permanent headquarters at Grand Central Palace (480 Lexington Avenue, New York City). Facilities include recital hall which seats 75, a large upright 12 x 15 foot translucent screen, reception room, studio, workshop, projection room, storage



GRAND CENTRAL PALACE, NEW YORK CITY, U. S. A

1934

78

space, and keyboard room slightly raised at rear of recital hall. Installs clavilux containing four tiers of 32 projectors. Displays one of Van Dearing Perrine's color organs and the original Huntington L.I. keyboard. Two public lumia recitals given weekly, November through May.

Creates four lumia murals projected from 5000 watt multiplate instruments for Dairy Building Theatre, Chicago World's Fair (A Century of Progress), sponsored by Dr. Van Norman. Makes drawings for each scene on 24 x 30 inch boards which are then curved and photographed to correspond with the shape of the 80 foot long theatre wall.

1934

January 19: Opening recital at Grand Central Palace.

Summer: Nightly lumia recitals given by technician with clavilux projected on 30 x 24 foot screen at outdoor court of the Hall of Science (Chicago World's Fair, A Century of Progress, 1933-34); clavilux instrument consists of five large units (two 5000 watt and three 2000 watt).

1938

Summer: Works with R.C.A., New York City on the telecast of clavilux compositions in conjunction with NBC-TV.

1939

Incorporates The Art Institute of Light as a New York State non-profit corporation.

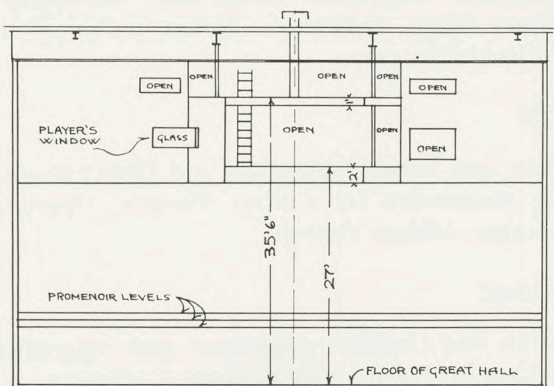
1941

January 5: First performs a mood setting for *Swan of Tuonela* by Jean Sibelius at Grand Central Palace.

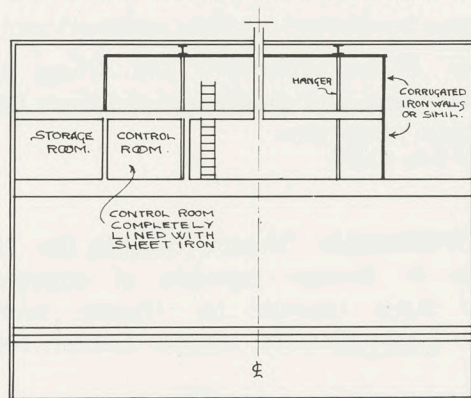
1942

August 7-September 22: Builds studio, West Nyack, New York, (18 x 20 x 11 feet).





SECTION Y-Y • VIEW FROM SCREEN TOWARD PROJECTION ROOM

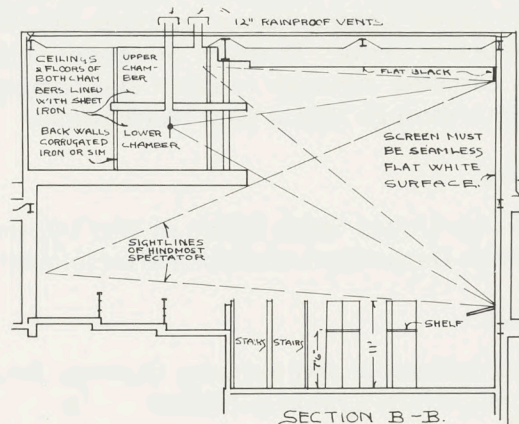


SECTION X-X • THRU THE TWO PROJECTION LEVELS

# CENTURY DAIRY EXHIBIT BUILDING AT A CENTURY OF PROGRESS EXPOSITION, CHICAGO 1933

ALTERATIONS IN  
PROJECTION ROOM  
FLOOR LEVELS  
AND WALLS TO  
PERMIT PROPER  
INSTALLATION OF  
ALL EQUIPMENT

THOMAS WILFRED  
ARTIST IN LIGHT  
20 WEST 22 ST  
NEW YORK, N. Y.  
SEPT. 21st 1932  
SCALE: 1/8" = 1'0"  
DRAWING # 3291

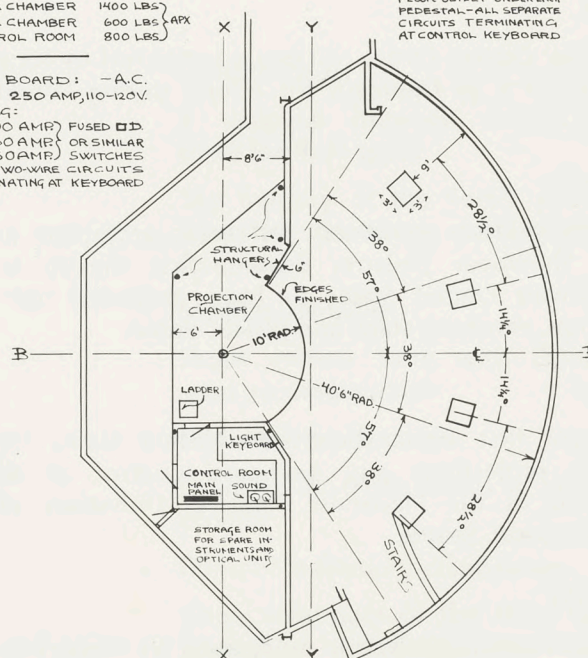


SECTION B-B.

WEIGHT OF LIGHTING EQUIP:  
LOWER CHAMBER 1400 LBS.  
UPPER CHAMBER 600 LBS. APX  
CONTROL ROOM 800 LBS.

PANEL BOARD: - A.C.  
MAIN: 250 AMP, 110-120V.  
FEEDING:  
1 - 100 AMP FUSED  
1 - 60 AMP OR SIMILAR  
3 - 30 AMP SWITCHES  
ALL TWO-WIRE CIRCUITS  
TERMINATING AT KEYBOARD

ONE 20 AMP AND ONE 10 AMP  
FLOOR OUTLET UNDER EACH  
PEDESTAL - ALL SEPARATE  
CIRCUITS TERMINATING  
AT CONTROL KEYBOARD





1943

The Art Institute of Light, Inc. closes to the public when Grand Central Palace becomes World War II induction center. Program of recitals and lectures curtailed, although research and composition continue through 1968 at West Nyack studio.

1943-45

Works for United States Office of War Information in Danish Department as editor and announcer.

1945-47

Writes manuscript and executes drawings for book on lumia, which is never published.

1946

August: Danish Order of Liberty conferred by King Christian X of Denmark for efforts during World War II.

1949-50

Converts Dairy equipment for scenic projection at the Showboat Theatre, Seattle; first theatre in northwest United States to have projected light settings, revolving stage and plaster dome.

1951

Designs first arena theatre in United States for lumia projections and keyboard control of all lighting at the Playhouse Theatre, University of Washington, Seattle.

1951-52

Designs scenic projection equipment for Repertory Theatre, Seattle. Designs two special projectors for Seattle Museum of Science and Industry, Seattle.

1952

Creates two mobile continuous playing light settings for the Seattle Historical Society.

1953

Designs two 5000 watt outdoor scenic projectors for Aqua Theatre, Seattle.

1953-57

Develops Magnalux Objective, Multiplate, and Direct Beam projectors. Writes technical manual *Projected Scenery*.

1957

Plans and installs Multiplate and Direct Beam lighting equipment for Center Theatre, University of Georgia, Athens, Georgia.

1960-61

Builds two Uniplate projectors and Magnalux Objectives for Fresno State College, California.

1962

January: Enters agreement with Kliegl Bros. for manufacturing and marketing of Direct Beam and Multiplate projectors.

1967

June 3: Discusses "Theatre outside the Theatres" as one of thirteen panelists at convention of United States Institute for Theatre Technology, held in Forum Theatre, Lincoln Center, New York City.

1968

June 10: Receives honorary Doctorate of Fine Arts from Philadelphia College of Art.  
August 15: Dies in a Nyack hospital, Nyack, New York.



# LIST OF COMPOSITIONS FOR THE CLAVILUX

Missing Opus Numbers indicate unfinished compositions.

| DATE                   | OPUS NUMBER | NAME             | DESCRIPTION   |
|------------------------|-------------|------------------|---|
| 1924                   | 27          | Black and White  | A dialogue between single and triple forms in space   |
| 1924                   | 31          | Enchanted Forest | The mystery of the Forest and its legendary creatures; partially representative   |
| 1924                   | 33          | Machine          | Mechanical ballet   |
| 1924                   | 39          | Triangular Etude | Single central form with diaphanous accompaniment   |
| 1934                   | 56          | City Windows     | Metropolitan Nocturne   |
| 1923<br>(revised 1935) | 59          | Abstract         | Double and triple forms in counterpoint   |
| 1935                   | 60          | Flight           | Contrast in Motion; diaphanous  |
| 1935                   | 65          | Chalice          | Visual treatment of the Holy Grail Legend   |
| 1935                   | 68          | Horizontal Study | Color moods of the ocean; rhythm of waves   |
| 1936                   | 69          | Chorus           | Near-human forms in identical rapid movements   |
| 1936                   | 71          | Rhythm in Steel  | Patterns of girders in motion   |
| 1936                   | 73          | Spiral Etude     | Spiral themes in progressive orbits on a strong pulsation of colors in space; inspired by concluding lines of Holmes' <i>Chambered Nautilus</i> |



| DATE | OPUS NUMBER | NAME                         | DESCRIPTION  |
|------|-------------|------------------------------|--|
| 1936 | 75          | Study in Rising Forms        | Forms ascending in space and unfolding in color over a restless angular accompaniment  |
| 1937 | 76          | Fantastic Prelude            | Procession of abstract forms in parabolic orbits between tiers of static and mobile arches of blackness  |
| 1937 | 78          | Gothic Suite                 | Color and sound: a visual setting for <i>Symphonie Gothique</i> by Widor   |
| 1937 | 80          | Study in Black and White III |  |
| 1938 | 83          | First Study in Depth         | Horizontal sequence of abstract forms in space   |
| 1938 | 86          | Surge                        | Vertical expansion; storm rhythm   |
| 1938 | 87          | Orientale                    | An <i>Arabian Nights</i> fantasy   |
| 1938 | 90          | Receding Forms               | Simple sequence in deep space  |
| 1938 | 94          | Elliptical Prelude           | Intense color sequence between static white flutings   |
| 1938 | 95          | Majestic Study               | Curving and interlacing horizontals  |
| 1938 | 96          | Counterpoint in Space        | An intricate spacetime treatment in rapid tempo of four forms in diagonal arrangement over an accompaniment of ultramarine and blue curves in horizontal alternation |
| 1939 | 97          | Abstract                     | Multiple swinging forms; a crescendo of white on blue  |



| DATE     | OPUS NUMBER | NAME                    | DESCRIPTION                                    |
|----------|-------------|-------------------------|--|
| 1939     | 99          | Reflections             | Rapid motion seen through heavy silhouette     |
| ca. 1939 | 102         | Abstract                | Diagonal Prelude                               |
| 1939     | 103         | Spherical Rhythm        |  |
| 1938     | 104         | Third Study in Depth    |  |
| 1939     | 105         | Crescendo               | Progressive groupings in rapid tempi           |
| 1939     | 107         | Poem in Light           | Single and double forms opening and closing    |
| 1939     | 108         | Once upon a Time        | Departure; the Quest Journey; El-fins; Arrival |
| 1939     | 110         | Second Diagonal Prelude | Contrasting parabolic orbits                   |
| 1939     | 111         | Monochrome in Light     | Multiple forms swinging and rising             |
| 1939     | 112         | Pastorale               | Nocturnal mood of tranquil meditation          |
| 1940     | 113         | Arabesque               | Spacetime sequence in curves                   |
| 1940     | 114         | Symmetrical Sequence    | Forms in symmetrical developments              |
| 1940     | 115         | Moment in Space         | Diaphanous forms in flight rhythm              |
| 1940     | 116         | Abstract                | Ascending and expanding forms                  |
| 1940     | 119         | Nocturne                | Forms expanding from a static center           |



| DATE | OPUS NUMBER | NAME              | DESCRIPTION                                |
|------|-------------|-------------------|--|
| 1940 | 120         | Lumia Suite       |  |
| 1941 | 121         | Third Orientale   | An <i>Arabian Nights</i> fantasy           |
| 1941 | 123         | Aspiration        | Descending masses; small rising forms      |
| 1941 | 124         | Space Curves      | A study in depth with vertical motion      |
| 1941 | 125         | Plane Curves      | Intersecting forms in primary colors       |
| 1941 | 126         | Intermezzo        | Folding and expanding theme                |
| 1941 | 127         | Unfolding         | Rising and interlacing tendrils of light   |
| 1941 | 128         | Visual Setting    | For the <i>Swan of Tuonela</i> by Sibelius |
| 1941 | 129         | Convolux          |  |
| 1941 | 130         | Liberation        |  |
| 1941 | 131         | Color Prelude     |  |
| 1942 | 132         | Drift             |  |
| 1942 | 133         | Radiant Interlude |  |
| 1942 | 134         | Abstract          |  |
| 1942 | 135         | Memory            |  |



## LIST OF RECORDED COMPOSITIONS

Missing Opus Numbers denote compositions which were never completed. All measurements are given for the size of the screen, height preceding width. *Length of composition* indicates how long it takes for all elements to repeat the exact patterns planned by the artist. *Color cycle* specifies the length of time for each color sequence in the composition. *Form cycle* refers to the length of time for each form sequence in the composition. *Coincidence* indicates how long it takes for form and color cycles to repeat exactly, with differences in motion, intensity, and other elements. *Description* uses Wilfred's own terminology to relate the structure of the instrument and the development of the composition.



| DATE              | OPUS<br>NUMBER | NAME  | SIZE OF SCREEN         | LENGTH OF<br>COMPOSITION         |
|-------------------|----------------|---|------------------------|----------------------------------|
| 1928-<br>1933     |                | First Table Model<br>Clavilux: Luminar,<br>#36, 49-55 |                        |                                  |
| 1928              |                | #50: Elliptical<br>Prelude and Chalice                |                        |                                  |
| 1930              |                | First Home Clavilux<br>Model, #82-97                  |                        |                                  |
|                   | 74             | #93   | 21 1/2 x 17 1/4"       |                                  |
|                   | 83             | #95, Receding Forms                                   |                        | 56 minutes                       |
| 1932              | 79             | Multidimensional<br>(Bornholmer #175)                 | 9 3/4 x 11"            | 20 minutes                       |
| 1934<br>(July 23) | 91             | The Firebird<br>(Abstract)                            | 29 x 38 1/2"           |                                  |
| 1935<br>(June 4)  | 92             | Tranquil Study  | 28 3/4 x 38 1/2"       | 5 minutes, 15 seconds            |
| 1935-<br>36       |                | First Home Lumia<br>Instrument, #161,<br>167-170      |                        |                                  |
|                   | 81             | #167, Nocturne (1929)                                 |                        | 20 minutes                       |
|                   | 72             | #168, Elliptical (1931)                               |                        | 20 minutes                       |
|                   | 142            | #169, Vertical<br>Sequence III (1954)                 |                        | 20 minutes                       |
| 1940              | 136            | Vertical Sequence I                                   | 15 x 15 inches         | 37 hours, 28 minutes, 47 seconds |
| 1941              | 137            | Vertical Sequence II                                  | 15 1/4 x 15 3/8 inches | 2 days, 12 hours, 59 minutes     |



| COLOR CYCLE                                 | FORM CYCLE   | COINCIDENCE             | DESCRIPTION  |
|---|--|-------------------------|--|
| 1 Revolution<br>in 8 minutes,<br>30 seconds | Lamp rotates<br>1 RPM  |                         | Double cone internal reflector<br>Rotating 500 watt lamp<br>2- 9 3/4 inch color records on<br>sliding base<br>Aluminum cabinet<br>Remodeled 1929   |
|   |  |                         | Double cone internal reflector<br>100 watt moving lamp<br>Changeable color records<br>Extension keyboards controlling shutter and<br>three floodlights for units #83-97<br>Curved opaque screen                      |
| 4 minutes                                   | 2 minutes,<br>30 seconds   | 8:5 ratio               | Static work; no motors or movements<br>Single 150 watt lamp  |
|   |  |                         | Sequence of multiple white forms horizontal-<br>ly moving over an abstract static background:<br>introductory statement, horizontal movement,<br>vertical movement, conclusion: horizontal and<br>vertical interplay |
|   |  |                         | Vertically moving 150 watt lamp<br>Extension keyboard<br>Adjustable horizon mask   |
|   |  |                         | Aluminum Cabinet<br>Screen opens from the front<br>Destroyed   |
|   | Vertical: 1<br>revolution<br>every 6 minutes<br>Horizontal: 1<br>revolution every<br>5 minutes, 47 seconds |                         | Wood cabinet<br>Mobile lamp unit   |
| 7 minutes,<br>17 seconds                    | 7 minutes  | 50 hours,<br>59 minutes | Oak cabinet<br>Static lamp<br>Primary motif: four groups of vertically as-<br>cending forms; secondary motif: descending<br>accompaniment to the rising form sequence  |



| DATE                         | OPUS<br>NUMBER | NAME                            | SIZE OF SCREEN         | LENGTH OF<br>COMPOSITION                               |
|------------------------------|----------------|---------------------------------|------------------------|--|
| 1948                         | 140            | Visual Counterpoint             | 15 x 15 inches         | 11 hours, 7 minutes, 30 seconds                        |
| 1954                         | 143            | Ascending Forms                 | 22 x 15 inches         | 11 hours, 53 minutes, 44 seconds                       |
| 1954                         | 144            | Fourth Study in<br>Rising Forms | 20 x 16 inches         | 34 hours, 42 minutes, 22 seconds                       |
| 1955                         | 145            | Aspiration                      | 19 1/4 x 15 inches     | 42 hours, 14 minutes, 11 seconds                       |
| 1956                         | 146            | Counterpoint in<br>Space        | 20 x 16 inches         | 44 hours, 31 minutes, 50 seconds                       |
| 1957                         | 147            | Multidimensional                | 19 1/4 x 15 1/2 inches | 129 days, 9 hours, 35 minutes                          |
| 1958<br>(May 22-<br>June 27) | 148            | Nocturne                        | 16 x 20"               | 5 years, 359 days, 19 hours,<br>20 minutes, 48 seconds |
| 1959<br>(May 5-<br>Sept. 29) | 152            | Study in Depth                  | 6 x 9 ft.              | 142 days, 2 hours, 10 minutes                          |
| 1960<br>(Jan.-April<br>23)   | 153            | Spacetime Study                 | 19 1/2 x 15 3/8"       | 14 days, 14 hours, 33 minutes                          |



| COLOR CYCLE               | FORM CYCLE   | COINCIDENCE                     | DESCRIPTION  |
|---------------------------|--|---------------------------------|--|
| 7 minutes,<br>30 seconds  | 7 minutes,<br>25 seconds   |                                 | Aluminum cabinet<br>Static lamp<br>Primary motif: complex eclipses between diaphanous forms; constant variation of form and color cycles   |
| 5 minutes,<br>49 seconds  | 5 minutes,<br>58 seconds   |                                 | Oak cabinet<br>Theme with 101 variations. Form sequence repeats each time with a different color development   |
| 6 minutes,<br>37 seconds  | 6 minutes,<br>23 seconds   | 1 hour, 10<br>minutes           | Oak cabinet<br>Theme with 349 variations. Primary motif: Rising forms repeat each time with a different color development; secondary motif: accompaniment of diagonally descending forms |
| 6 minutes,<br>50 seconds  | 6 minutes,<br>31 seconds   | 2 hours, 15<br>minutes          | Oak cabinet<br>Theme with 397 variations. Form cycle repeats each time with a different color treatment  |
| 6 minutes,<br>50 seconds  | 6 minutes,<br>31 seconds   | 2 hours, 15<br>minutes          | Oak cabinet<br>Theme with 410 variations. Primary motif: Ascending, forms moving outward; secondary motif: diagonally descending forms   |
| 7 minutes,<br>29 seconds  | 6 minutes,<br>55 seconds   | 2 hours, 30<br>minutes          | Oak cabinet<br>Theme with 449 variations: Form sequence repeats, each time with a different color treatment  |
| 11 minutes,<br>41 seconds | 13 minutes,<br>13 seconds  | 6 days, 10<br>hours, 24 minutes | Oak cabinet<br>Theme with 793 variations; primary motion is horizontal<br>Prototype for "Space Drift, op. 154" (1960)  |
| 8 minutes,<br>35 seconds  | upper: 30<br>minutes, 60<br>seconds<br>lower: 22<br>minutes, 20<br>seconds | 18 days                         | Fourteen groups of forms<br>Prototype for "Lumia Suite, op. 158" (1964)  |
| 5 minutes,<br>7 seconds   | 6 minutes,<br>9 seconds  | 2 hours,<br>45 minutes          | Oak cabinet<br>Theme with 369 variations. Primary motif: Ascending forms, opening and moving outward; secondary motif: diagonally and horizontally expanding forms                       |



| DATE                                     | OPUS<br>NUMBER | NAME              | SIZE OF SCREEN                                | LENGTH OF<br>COMPOSITION                  |
|--|----------------|-------------------|---|---|
| 1960<br>(July 2-<br>Sept. 27)            | 154            | Spacedrift        | 15 1/2 x 19 1/2"                              | 1 year, 164 days, 21 hours,<br>54 minutes |
| 1961<br>(Feb. 19)                        | 155            | Orientale         | 25 x 53 ft. (outdoor)<br>10 x 15 ft. (indoor) | 500 hours                                 |
| 1964<br>(Sept.<br>1963- May<br>1964)     | 158            | Lumia Suite       | 6 x 8 ft.                                     |   |
| 1965<br>(May 21, 1962-<br>Jan. 12, 1965) | 159            | Sequence in Space | 20 x 16"                                      | 366 hours, 27 minutes                     |
| 1965<br>(May 20, 1965-<br>July 1, 1965)  | 160            | Convolux          | 30 x 25"                                      | 15 days, 19 hours                         |
| 1966<br>(May 20, 1965-<br>Dec. 7, 1965)  | 161            | Untitled          | 51 x 32"                                      | 1 year, 315 days, 12 hours                |
| 1968                                     | 162            | Luccatta          | 3 x 4 ft.                                     |   |



# COLOR CYCLE

# FORM CYCLE

# COINCIDENCE

# DESCRIPTION

Oak cabinet  
Two Speed reflector drive  
Primary motion is horizontal

Aluminum cabinet  
Three plane 5000 watt Focal Stage projector; adaptable for rear projection.  
Twenty-four groups of forms; Primary motion is horizontal. Form sequence repeats each time with a different color treatment

Twelve minute cycles comprising three movements: Horizontal — large diaphanous forms moving from left to right; Vertical — form moving from bottom to top; Elliptical, a descending arc slowly transforming horizontal sequence into a central vortex of expanding and interlacing ellipses  
Form sequence repeats each time with a different color development

2 hours,  
15 minutes

Oak cabinet  
Primary motif: Rising, opening and receding;  
Secondary motif: descending, turning, advancing; rhythmic accents: elliptical ascending form with changes of intensity  
Form cycle repeats each time with a different color treatment

5 minutes,  
36 seconds

6 minutes,  
51 seconds

Oak cabinet  
Primary motif: descending and opening forms;  
secondary motif: Ascending and receding forms

5 minutes,  
51 seconds

right: 7  
minutes, 30  
seconds  
left: 6  
minutes, 36  
seconds  
Left and  
right coincide  
every 46 hours,  
30 minutes

Two speed reflector drive as in "Spacedrift, op. 154"

Twelve minutes cycle comprising three movements: Horizontal, Multidirectional, Vertical



## MAJOR EXHIBITIONS

1952 The Museum of Modern Art, New York. *15 Americans*, April 9—July 27, 1952.

ELLIPTICAL, op. 72, 1931

MULTIDIMENSIONAL, op. 79, 1932

STUDY IN DEPTH, op. 83, 1933

VERTICAL SEQUENCE, op. 137, 1941

VISUAL COUNTERPOINT, op. 140, 1950

1958 The Museum of Modern Art, New York. *Photographs From the Museum Collection*, November 26, 1958—January 18, 1959.

Photographs of UNFOLDING, op. 127, 1941

The Metropolitan Museum of Art, Junior Museum, New York. *How to Look at Paintings*, September 17, 1958—June 30, 1960.

COUNTERPOINT IN SPACE, op. 146

1961 Stedelijk Museum, Amsterdam. *Rörelse I Konsten* (Movement in Art), March 10—April 17, 1961. (Shown thereafter at Moderna Museet, Stockholm, May 17—September 3, 1961.)

SPACETIME STUDY, op. 153, 1960

The Museum of Modern Art, New York. *Recent Acquisitions: Painting and Sculpture*, December 19, 1961—February 25, 1962.

ASPIRATION, op. 145, 1955

1962 The Museum of Modern Art, New York. *Paintings, Sculpture and Graphic Art from the Museum Collection*, October 26, 1962—November 8, 1963.

ASPIRATION, op. 145, 1955

1966 Stedelijk van Abbemuseum, Eindhoven. *Kunst Licht Kunst*, September 25—December 4, 1966.

CONVOLUX, op. 160, 1966

1967 The New Jersey State Museum, Cultural Center, Trenton. *Focus on Light*, May 20—September 10, 1967.

VERTICAL SEQUENCE, op. 137, 1941

The Howard Wise Gallery, New York. *Lights in Orbit*, January 28—March 7, 1967.



ASPIRATION, op. 145, 1955

Walker Art Center, Minneapolis. *Light/Motion/Space*, April 8—May 21, 1967. (Shown thereafter at Milwaukee Art Center, Milwaukee June 24—July 30, 1967.)

ASPIRATION, op. 145, 1955

Worcester Art Museum, Worcester. *Light and Motion*, November 9, 1967—January 2, 1968.

ASPIRATION, op. 145, 1955

The Howard Wise Gallery, New York. *Festival of Lights*, December 9, 1967—January 6, 1968.

VERTICAL SEQUENCE, op. 137, 1941

1969 UCLA Art Galleries, Los Angeles. *Electric Art*, January 19—March 23, 1969.

SEQUENCE IN SPACE, op. 159, 1965

1971 The Portland Museum of Art, Portland, Maine. *Light: Wilfred to Antonakos*. January 12—February 21, 1971.

ASPIRATION, op. 145, 1955



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# CHECKLIST OF THE EXHIBITION

## INSTRUMENTS

The works in this exhibition are internally programmed, self-operating instruments. Refer to *List of Recorded Compositions* for technical description and data.

1. FIRST TABLE MODEL CLAVILUX  
(Luminar), #50, 1928  
Collection of Earl Reiback, New York
2. MULTIDIMENSIONAL, op. 79, 1932  
Collection of Earl Reiback, New York
3. FIRST HOME CLAVILUX #93  
(Clavilux Junior), 1930  
Collection of Earl Reiback, New York
4. THE FIREBIRD, op. 91, 1934  
Collection of Thomas C. Wilfred, Palisades,  
New York
5. TRANQUIL STUDY, op. 92, 1935  
Collection of Thomas C. Wilfred, Palisades,  
New York
6. LUMIA HOME INSTRUMENT, #168, 1935-36  
Elliptical op. 72, 1931  
Collection of Richard Caine Striker, New  
York
7. VERTICAL SEQUENCE I, op. 136, 1941  
Collection of Thomas C. Wilfred, Palisades,  
New York
8. VERTICAL SEQUENCE II, op. 137, 1941  
Collection of The Museum of Modern Art,  
New York, purchase, 1942
9. ASPIRATION, op. 145, 1955  
Collection of The Museum of Modern Art,  
New York, gift of Mr. and Mrs. Julius  
Stulman, 1961
10. COUNTERPOINT IN SPACE, op. 146, 1956  
Collection of The Metropolitan Museum of  
Art, New York
11. MULTIDIMENSIONAL, op. 147, 1956  
Collection of A. Epstein and Sons, Inc., Chi-  
cago, Illinois
12. NOCTURNE, op. 148, 1958  
Anonymous, New York
13. STUDY IN DEPTH, op. 152, 1959  
Collection of The Clairol Corporation, New  
York
14. SPACETIME STUDY, op. 153, 1960  
Collection of Joslyn Art Museum, Omaha,  
Nebraska
15. SPACEDRIFT, op. 154, 1960  
Collection of Edwin A. Bergman, Chicago,  
Illinois
16. ORIENTALE, op. 155, 1962  
Collection of The Corcoran Gallery of Art;  
courtesy of the Friends of the Corcoran.
17. SEQUENCE IN SPACE, op. 159, 1965  
Collection of Eugene E. Epstein, Ph.D., Los  
Angeles, California
18. Untitled, op. 161, 1968  
Collection of Earl Reiback, New York
19. LUCCATTA, op. 162, 1968  
Collection of The Lannan Foundation, Palm  
Beach, Florida



## DRAWINGS

Works have been listed in their chronological order as nearly as possible. (Dates) in parentheses do not appear on the works. Composition dimensions are given in inches, height preceding width.

20. DIRECT BEAM PROJECTOR, May 14, 1924  
Pen and ink on tracing paper,  $18\frac{5}{8} \times 25$   
Collection of Earl Reiback, New York
21. STUDY OF DANCING FIGURE, (1924)  
Pencil on paper,  $4 \times 9\frac{1}{4}$   
Collection of Thomas C. Wilfred, Palisades, New York
22. RELATIVE POSITIONS OF MOVING ELEMENTS AS FUNCTION OF TIME: FAST, MEDIUM, SLOW, (1928)  
Pen and ink on linen backed paper,  $21 \times 30\frac{1}{8}$   
Collection of Earl Reiback, New York
23. THE CLAVILUX SILENT VISUAL CARILLON, 1928  
Gouache on paper,  $11\frac{1}{2} \times 8\frac{1}{2}$   
Collection of Thomas C. Wilfred, Palisades, New York
24. DEVELOPMENT OF FORM AND COLOR FOR LIGHT SETTING, (1928)  
Pencil on paper,  $8\frac{1}{2} \times 11$   
Collection of Thomas C. Wilfred, Palisades, New York
25. DRAWING FOR BACKDROP: *THE VIKINGS AT HELGELAND*, acts I and IV, 1928  
Pen and ink on paper,  $8\frac{1}{8} \times 10\frac{7}{8}$   
Collection of Thomas C. Wilfred, Palisades, New York
26. DRAWING FOR BACKDROP: *THE VIKINGS AT HELGELAND*, acts II and III, 1928  
Pen and ink on paper,  $8\frac{5}{16} \times 11$   
Collection of Thomas C. Wilfred, Palisades, New York
27. STUDY OF FORM AND COLOR CYCLE FOR LIGHT SETTING, (1928)  
Pencil and crayon on paper,  $9\frac{3}{4} \times 6\frac{1}{2}$   
Collection of Thomas C. Wilfred, Palisades, New York
28. DROP FOR OVERTURE, AMERICANA, September, 1928  
Gouache on paper,  $7\frac{1}{2} \times 11$   
Collection of Thomas C. Wilfred, Palisades, New York
29. TOWER OF A TALL BUILDING SURMOUNTED BY A CLAVILUX SILENT VISUAL CARILLON, 1928  
Pencil and ink on linen backed paper,  $32\frac{7}{8} \times 40\frac{7}{8}$   
Collection of Earl Reiback, New York
30. ELECTRICAL AND MECHANICAL LAYOUT OF CONTROL ROOM, SHOWING CONSTRUCTION AND POSITION OF THE CLAVILUX CONTROL KEYBOARD AND CORRECTED WIRING DIAGRAM FOR SHERMAN ANNEX, CHICAGO, DRAWING #280, July 24, 1929  
Pen and ink on linen backed paper,  $23 \times 30\frac{3}{16}$   
Collection of Earl Reiback, New York
31. STATIC AND MOBILE PROJECTORS, SHERMAN HOTEL, CHICAGO, DRAWING #281, 1929  
Pen and ink on linen backed paper,  $21 \frac{5}{16} \times 30$   
Collection of Earl Reiback, New York
32. PLAN OF PROJECTION ROOM, SHERMAN HOTEL, CHICAGO, DRAWING #282, 1929  
Pen and ink on linen backed paper,  $22\frac{3}{4} \times 30\frac{5}{16}$   
Collection of Earl Reiback, New York
33. TRANSVERSE SECTION OF BALLROOM IN HOTEL SHERMAN, CHICAGO, 1929  
Blueprint,  $9\frac{3}{4} \times 16\frac{3}{4}$   
Collection of Thomas C. Wilfred, Palisades, New York
34. AQUARIUM ROOM, HOTEL SHERMAN, CHICAGO, DRAWING #3123, May 26, 1931  
Pen and ink on tracing paper,  $15\frac{1}{16} \times 21\frac{11}{16}$   
Collection of Earl Reiback, New York



35. PLAN FOR DECORATION OF AQUARIUM ROOM, HOTEL SHERMAN, CHICAGO, DRAWING #3125, September 11, 1931  
Pencil, pen and ink and crayon on paper, 21¼ x 18½  
Collection of Thomas C. Wilfred, Palisades, New York
36. SUSPENDED CLAVILUX INSTRUMENT FOR THE PROJECTION OF A CONTINUOUS MOBILE MURAL OF LIGHT IN A ROTUNDA, DRAWING #806, March, 1931  
Pencil, pen and ink on tracing paper, 23¾ x 17 3/16  
Collection of Earl Reiback, New York
37. PLAN FOR CENTURY DAIRY EXHIBIT BUILDING, DRAWING #3291, 1933  
Pen and ink on tracing paper, 17⅞ x 19⅞  
Collection of Earl Reiback, New York
38. HISTORY OF *THE FIREBIRD*, op. 91, 1934  
Pencil and red pencil on paper, 7½ x 7½  
Collection of Thomas C. Wilfred, Palisades, New York
39. MOTIFS FROM *CITY WINDOWS*, 1934  
Watercolor on paper, 5¾ x 6½  
Collection of Thomas C. Wilfred, Palisades, New York
40. NOTATION FOR *CHALICE*, op. 65, 1932  
Pencil, pen and ink and colored pencil on paper, 14¾ x 8½ and 11 x 1  
Collection of Thomas C. Wilfred, Palisades, New York
41. HISTORY OF *TRANQUIL STUDY*, op. 92, 1935  
Pencil and colored pencil on paper, 9⅞ x 8¼  
Collection of Thomas C. Wilfred, Palisades, New York
42. FORM DEVELOPMENT FOR *TRANQUIL STUDY*, op. 92, 1935  
Pencil on paper, 9¾ x 6½  
Collection of Thomas C. Wilfred, Palisades, New York
43. STUDY OF FORM CYCLE DEVELOPMENT, (1938)  
Pencil on paper, 9¾ x 6½  
Collection of Thomas C. Wilfred, Palisades, New York
44. *LUMIA SUITE*, op. 120, 1940  
Pencil on paper, 10¾ x 7¾  
Collection of Thomas C. Wilfred, Palisades, New York
45. HISTORY OF *VERTICAL SEQUENCE*, op. 137, 1941  
Pencil, colored pencil and pen and ink on paper, 11 x 8¼  
Collection of Thomas C. Wilfred, Palisades, New York
46. SEQUENTIAL DEVELOPMENT OF THREE FORM GROUPS, (1948)  
Colored pencil and pen and ink on paper, 18⅝ x 26⅝  
Collection of Earl Reiback, New York
47. TRAVELING PROJECTION BRIDGE FOR ONE 5000 WATT MULTIPLATE AND TWO 2100 DIRECT BEAM SCENIC PROJECTORS, (1950-57)  
Pencil and ink on paper, 13⅜ x 16¼  
Collection of Earl Reiback, New York
48. 5000 WATT MULTIPLATE SCENIC PROJECTOR, (1950-57)  
Pen and ink on paper, 10 1/16 x 16⅞  
Collection of Earl Reiback, New York
49. IMPROVED ARRANGEMENT FOR SWINGING PROJECTION CHAMBER ON THE WILFRED MULTIPLATE, (1950-57)  
Pencil and pen and ink on paper, 12½ x 15 11/16  
Collection of Earl Reiback, New York
50. 5000 WATT LATERAL TYPE, WILFRED MULTIPLATE SCENIC PROJECTOR WITH f:2 MAGNALUX OBJECTIVE, (1950-57)  
Pencil and pen and ink on paper, 12 x 15¾  
Collection of Earl Reiback, New York
51. 5000 WATT WILFRED MULTIPLATE PROJECTOR, (1950-57)  
Pen and ink on paper, 16⅞ x 13 7/16  
Collection of Earl Reiback, New York
52. 5000 WATT LAMPHOUSE FOR MULTIPLATE PROJECTOR, (1950-57)  
Pen and ink on tracing paper, 16 3/16 x 12⅞  
Collection of Earl Reiback, New York



53. LAMPHOUSE DETAILS FOR 5000 WATT MULTI-  
PLATE PROJECTOR, (1950-57)  
Pencil on tracing paper, 11 5/16 x 15 1/2  
Collection of Earl Reiback, New York
54. 5000 WATT WILFRED MULTIPLATE RELEASE  
OF ROTOR SOLENOID AND LEVER SYSTEM,  
(1950-57)  
Pencil on tracing paper, 15 1/8 x 11 1/4  
Collection of Earl Reiback, New York
55. 5000 WATT WILFRED MULTIPLATE SCENIC  
PROJECTOR. OPTICAL SYSTEM AND PLATE  
ROTOR, (1950-57)  
Pencil and pen and ink on tracing paper,  
14 x 16 5/8  
Collection of Earl Reiback, New York
56. 5KW LATERAL MODEL MULTIPLATE SCENIC  
PROJECTOR, (1950-57)  
Pen and ink on tracing paper, 13 1/2 x 10  
Collection of Earl Reiback, New York
57. DIAGRAMMATIC FRONT VIEW OF 5KW LAT-  
ERAL MODEL MULTIPLATE SCENIC PRO-  
JECTOR, (1950-57)  
Pen and ink on tracing paper, 9 3/4 x 10 1/4  
Collection of Earl Reiback, New York
58. 2100 WATT DIRECT BEAM LAMPHOUSE, (1950-  
57)  
Pencil on paper, 15 5/8 x 11 3/4  
Collection of Earl Reiback, New York
59. SIDE SECTION OF LOWER PART OF LAMP-  
HOUSE, (1950-57)  
Pencil on paper, 16 7/16 x 12 7/8  
Collection of Earl Reiback, New York
60. SIDE VIEW OF 2100 WATT DIRECT BEAM  
PROJECTOR COLOR FRAME DRIVE, (1950-  
57)  
Pencil and pen and ink on paper, 15 3/8 x 12 5/8  
Collection of Earl Reiback, New York
61. FRONT VIEW OF 2100 WATT DIRECT BEAM  
PROJECTOR COLOR FRAME DRIVE, (1950-57)  
Pencil and pen and ink on paper, 15 3/8 x 9 7/8  
Collection of Earl Reiback, New York
62. ARRANGEMENT OF COLORED GLASS STRIPS  
IN THE TWO MODIFIER FRAMES FOR 2100  
WATT DIRECT BEAM PROJECTOR, (1950-57)  
Pencil on paper, 15 3/4 x 12 3/4  
Collection of Earl Reiback, New York
63. DESIGN FOR DIRECT BEAM LIGHT SETTING,  
FOREGROUND FRAME, (1950-57)  
Crayon on tissue, 6 x 6 3/4  
Collection of Thomas C. Wilfred, Palisades,  
New York
64. DESIGN FOR DIRECT BEAM LIGHT SETTING,  
COMPLETE FOREGROUND FRAME, (1950-57)  
Pencil and crayon on tissue, 6 x 6 3/4  
Collection of Thomas C. Wilfred, Palisades,  
New York
65. 5000 WATT WILFRED MULTIPLATE SCENIC  
PROJECTOR, (1950-57)  
Pen and ink on tracing paper, 11 1/2 x 14 7/8  
Collection of Earl Reiback, New York
66. DESIGN FOR DIRECT BEAM LIGHT SETTING,  
INTERMEDIATE AND FOREGROUND FRAMES,  
(1950-57)  
Crayon on tissue, 9 x 7 1/8  
Collection of Thomas C. Wilfred, Palisades,  
New York
67. DESIGN FOR DIRECT BEAM LIGHT SETTING,  
INTERMEDIATE FRAME, (1950-57)  
Pencil and crayon on tissue, 6 x 6 3/4  
Collection of Thomas C. Wilfred, Palisades,  
New York
68. DESIGN FOR DIRECT BEAM LIGHT SETTING,  
INTERMEDIATE FRAME, (1950-57)  
Pencil and crayon on tissue, 6 x 6 3/4  
Collection of Thomas C. Wilfred, Palisades,  
New York
69. ROTATING SKYDRUM AND CHASSIS FOR 2100  
WATT WILFRED DIRECT BEAM SCENIC PRO-  
JECTOR, (1950-57)  
Pencil on tracing paper, 32 13/16 x 26  
Collection of Earl Reiback, New York
70. DESIGN OF INTERNAL MECHANISM FOR  
*NOCTURNE*, op. 148, 1958  
Pencil on paper, 14 1/8 x 24 1/2  
Collection of Earl Reiback, New York
71. DESIGN OF INTERNAL MECHANISM FOR



- NOCTURNE*, op. 148, 1958  
Pencil on paper, 19½ x 22½  
Collection of Earl Reiback, New York
72. COLOR WHEEL FOR *SPACEDRIFT*, op. 154, 1960  
Pencil on paper, 8⅞ x 8  
Collection of Thomas C. Wilfred, Palisades, New York
73. SHAPE AND DISPOSITION OF REFLECTING UNITS FOR *SPACEDRIFT*, op. 154, 1960  
Pencil and colored pencil on paper, 8½ x 11½  
Collection of Thomas C. Wilfred, Palisades, New York
74. DESIGN FOR INTERNAL MECHANISM FOR *SPACEDRIFT*, op. 154, October 27, 1960  
Pencil on paper, 19½ x 24½  
Collection of Earl Reiback, New York
75. SIDE ELEVATION AND CYCLE COMPUTATIONS FOR *SPACEDRIFT*, op. 154, 1960  
Pencil on paper, 14 x 27¾  
Collection of Earl Reiback, New York
76. DESIGN FOR INTERNAL MECHANISM FOR *SPACEDRIFT*, op. 154, 1960  
Pencil on blueprint, 21⅝ x 13⅞  
Collection of Earl Reiback, New York
77. 2100 WATT DIRECT BEAM CYLINDRICAL LENS ATTACHMENT FOR FLUTED COLUMNS (2), December 17, 1962  
Colored pencil on tracing paper over pencil on paper, 14 x 16⅜  
Collection of Earl Reiback, New York
78. PROJECTOR AND SPECTATOR DISPOSITION FOR *LUMIA SUITE*, op. 158, 1963-64  
Pencil and typewriter ink on tracing paper, 11 x 8½  
Collection of Thomas C. Wilfred, Palisades, New York
79. WIRING DIAGRAM FOR *LUMIA SUITE*, op. 158, 1963-64  
Pencil, colored pencil and red ink with collage on paper, 15 3/16 x 12½  
Collection of Thomas C. Wilfred, Palisades, New York
80. PROJECTION ROOM, SCREEN FRAME, INSTRUMENT SUPPORTS AND VENTILATING ARRANGEMENT FOR INSTALLATION OF *LUMIA SUITE*, op. 158, DRAWING #158-20GC, 1964  
Pencil on blueprint, 31⅜ x 30 7/16  
Collection of Earl Reiback, New York







PHOTOGRAPH CREDITS

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